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Halliburton NUS
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C-49-10-3-70

October 9, 1993

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Halliburton NUS Project No. 9594

Commanding Officer, Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop #82
Lester, Pennsylvania 19113-2090

Attention: Mr. Dave Miu

Reference: CLEAN Contract N62472-90-D-1298
Contract Task Order No. 129

Subject: Final Addenda to Planning Documents
Phase II Remedial Investigation
Naval Submarine Base New London, Groton, Connecticut

Dear Mr. Miu:

Enclosed are five copies of the subject document for your files. As you have requested, I have also included five copies of the Atlantic Phase II RI Work Plan, Field Sampling Plan, and Quality Assurance/Quality Control and Data Management Plans, dated May 1993. Copies of the subject document and the Atlantic Plans have also been sent to the TRC member list attached. All of the written comments received are attached with a written response for each comment.

If you have any questions or comments concerning these documents, please call me at (412) 921-8414.

Very truly yours,

Matthew G. Cochran

Matthew G. Cochran
Project Manager

MGC/jre
Enclosure

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Note: Number in parentheses indicates number of copies of reports

EPA COMMENTS AND HALLIBURTON NUS RESPONSES TO THE ADDENDUM TO PHASE II REMEDIAL INVESTIGATION PLANNING DOCUMENTS

GENERAL COMMENTS

COMMENT: There are some instances where previously proposed sampling activities were not incorporated into the scope of the work by either Halliburton NUS or Atlantic. For example, in the Area A Wetland, the proposed number of sediment samples is reduced from 33 to 29 without supporting explanation. In addition, the number of surface water samples in the same area is reduced from 13 to 9, but there is no corresponding reduction in Halliburton NUS' work scope on Table 4-15.

RESPONSE: Sediment samples 2WSD23 through 2WSD26 (4 total) were inadvertently omitted from Table 4-15 of the Field Sampling Plan Addendum. These samples have been added to the table. The samples will not be collected by Halliburton NUS and have been shaded appropriately.

A typographic error exists on page 70, 5th paragraph, 1st sentence of the Atlantic FSP which should be changed to "9" surface water samples instead of "13".

COMMENT: Although all of the work proposed for the Weapons Center is shown on Table 4-15 as work to be completed by Halliburton NUS, the Weapons Center subsection has been entirely deleted from Section 4.2.3.1

RESPONSE: The Weapons Center subsection has been reinserted into Section 4.2.3.1.

COMMENT: All tables and text need to be carefully edited to ensure that they include the entire scope of work to be executed by Halliburton NUS and Atlantic. Several errors and discrepancies were noted as detailed in the following specific comments.

RESPONSE: All tables and text have been carefully reviewed and edited (if necessary) to include all the work that is to be conducted by Halliburton NUS. It is not within the Halliburton NUS scope of work to detail work that is to be conducted by others.

However, those work items listed in the tables of the Atlantic planning documents that are not to be conducted by Halliburton NUS have been shaded as noted, which should aid in distinguishing between work to be conducted by Halliburton NUS, and work to be conducted by others.

COMMENT: Once corrections have been incorporated into the text, tables, and figures, revised replacement pages and plates should be issued so that copies of the final work plan can be updated.

RESPONSE: All text and tables which require revision have been outlined in the Addendum. Sections of text or tables that required significant revision were rewritten and included as replacement pages in the Addendum. Specific areas of the tables or text which required minor revision were identified with the required change listed without including replacement pages.

It is Halliburton NUS scope of work to provide an Addendum to the planning documents and not to revise the Atlantic planning documents and issue all pages which require revision.

WORK PLAN ADDENDUM

COMMENT: Table 7-16 This table does not agree with the text change in Section 7.2.4, which deletes test borings and XRF testing. The Soils section under Chemical Investigation should be shaded to indicate that

this work will be performed by Atlantic. A footnote should also be added to the table to clarify the meaning of the shading.

RESPONSE: Halliburton NUS will be collecting soil samples from monitoring well borings for XRF testing and laboratory analyses. Therefore, the soils section under chemical investigation of Table 7-16 will not require shading. The discussion of XRF testing has been reinserted into Section 7.2.4., and the section has been modified to include only those goals which pertain to the Halliburton NUS investigation. The footnote "Shaded areas are not to be completed by Halliburton NUS" has been added to all of the tables to clarifying the shading.

COMMENT: Table 7-18, 15MW1D Change "Bedrock/+/-50" to Bedrock/50±" to conform with the rest of the table.

RESPONSE: "Bedrock" in Table 7-18 has been revised as suggested.

COMMENT: Table 7-18 The subtotal for water samples should be 5, not 4, because a line was added to account for a water sample from 15MW1D (not 15MW1S as stated in the cover letter). The table and cover letter should be revised to account for these discrepancies.

RESPONSE: The subtotal in Table 7-18 and the second bullet item on page 2 of the cover letter have been revised as suggested.

COMMENT: In footnote 1, the acronym "tclp" should be "TCLP". Change "analyses" to "analysis".

RESPONSE: Footnote 1 of Table 7-18 has been revised as suggested.

COMMENT: In footnote 2, it should be corrected to read, "Subtotal.." rather than "Total ...".

RESPONSE: Footnote 2 of Table 7-18 has been revised as suggested.

COMMENT: The total for water should include 2 rounds of sampling, so the analyses totalling to 4 should be changed to 10, and the Engineering should total 2 instead of 1.

RESPONSE: The total for water in Table 7-18 has been revised as suggested.

COMMENT: A footnote should be added indicating the shaded work will be completed by Atlantic.

RESPONSE: The footnote "Shaded areas are not to be completed by Halliburton NUS" has been added to Table 7-18 as suggested.

COMMENT: §7.3.1 Soil samples may be obtained during drilling of a borehole which will subsequently be used for installation of a monitoring well, but they are not obtained from a monitoring well installation. Please revise.

RESPONSE: After further review by Halliburton NUS, it was discovered that soil samples will be collected from two test borings (2LTB13 and 2LTB23) to be drilled adjacent to the concrete pad, in addition to samples to be collected from boreholes which will be converted to monitoring wells. The first bullet item in Section 7.3.1 has been revised to reflect this response and as the comment as suggested.

COMMENT: Table 7-19 Clarify whether the new copy of Table 7-19 is to be substituted for the old version of this table (as is stated for Tables 7-16 and 7-18).

RESPONSE: Section 7 has been revised in its entirety.

COMMENT: Provide a footnote which states that shaded work will be completed by Atlantic.

RESPONSE: The footnote "Shaded areas are not to be completed by Halliburton NUS" has been added to Table 7-19 as suggested.

COMMENT: According to Table 7-21, test borings around Area A concrete pad will be conducted by Atlantic. Therefore, the first item of the subsurface soil portion of the Chemical Investigation (Row 5, Area A Landfill) should be shaded on Table 7-19 if Table 7-21 is correct.

RESPONSE: The area has been shaded as suggested.

COMMENT: According to Table 7-21, surficial soil sampling from Area A downstream watercourse will be conducted by Atlantic. The corresponding box(es) in Table 7-19 needs to be shaded, or the discrepancy corrected.

RESPONSE: The area has been shaded as suggested.

COMMENT: Table 7-21 Provide a footnote which states the shaded work will be completed by Atlantic.

RESPONSE: The footnote "Shaded areas are not to be completed by Halliburton NUS" has been added to Table 7-21 as suggested.

COMMENT: In footnote 2, it should be corrected to read, "Subtotal.." rather than "Total..".

RESPONSE: Footnote 2 of Table 7-21 has been revised as suggested.

COMMENT: Because the total number of water samples includes two sampling rounds, the total number of water samples should be 153, and total number of analyses for water needs to be recalculated.

RESPONSE: The total number of water samples has been revised and recalculated as suggested.

COMMENT: Under the "Proposed" section, "borings" should be singular, 5 lines from the end of the table.

RESPONSE: The table has been revised as suggested

COMMENT: §7.3.2.¶1 Soil samples may be obtained during drilling of a borehole which will subsequently be used for installation of a monitoring well, but they are not obtained from a monitoring well installation. Please revise.

RESPONSE: The first bulleted item of Section 7.3.2 has been revised as suggested.

COMMENT: Table 7-24 Test borings to further define the extent and degree of contamination are to be completed by Atlantic Environmental Services, according to Table 7-24. However, the shading of Table 7-23 implies that this work will be completed by Halliburton NUS. Correct the shading of the two tables to resolve this discrepancy.

RESPONSE: Halliburton NUS will collect soil samples from boreholes which will be converted to monitoring wells for all the parameters listed in Table 7-23 with the exception of Dioxin. No revisions to either Table 7-23 or Table 7-24 are required.

COMMENT: §9.1.2, ¶3 and ¶4 Since Halliburton NUS is not proposing to complete a fact sheet for the alternative selection process, the last paragraph of Section 9.1.2 does not apply and should be deleted. The previous paragraph should also be revised.

RESPONSE: The Section has been revised as suggested.

COMMENT: §11.2 Change Atlantic to Halliburton NUS.

RESPONSE: The change has been made as suggested.

COMMENT: §11.3, 11.4 Change the numbers in the revised section titles from 2.4 and 2.3 to 11.3 and 11.4, respectively.

RESPONSE: Section 11 has been revised in its entirety.

COMMENT: Figure 10-1 This figure and Figure 7-1 of the Field Sampling Plan Addendum indicate that air sampling is scheduled from December 23 through December 27, 1993. Collecting air samples during the winter for volatile organic compound (VOC) analysis is not recommended, particularly if worst case baseline data needs to be collected for a risk assessment. Ideally, air samples should be collected during periods of the year when ambient air temperatures are high and other meteorological conditions will enhance the volatilization of VOCs from soils or possible surface water.

RESPONSE: The air sampling activity has been moved to the summer of 1994 as suggested.

COMMENT: As part of the Quality Assurance/Quality Control Plan Addendum, Appendix B was attached that summarizes the samples to be collected at each site. For the Goss Cove Site, two rounds of VOC air samples are proposed to be collected. Are these the samples to be collected between December 23 and December 27, 1993, as stated above?

RESPONSE: The VOC air samples detailed in Appendix B of the Quality Assurance/Quality Control and Data Management Plan Addendum are the same samples to be collected between December 23 and December 27, 1993. However, after further review, the air sampling activity has been moved to the summer of 1994; and the two sample rounds shall be spaced approximately one month apart to provide adequate representation of the data during the summer months.

COMMENT: Plate 1 Consider revising this plate as an oversize plain-paper copy rather than a blueline. The detail on this plate is nearly impossible to read on a blueline.

RESPONSE: The plate has been copied on a lighter setting to minimize the dark background.

FIELD SAMPLING PLAN ADDENDUM

COMMENT: § 4.2.2.1, ¶1 Paragraph 4 of the work plan indicates that five samples will be collected in this area. One sample of the three to be collected downgradient of the rubble is being eliminated. Please provide justification for this and state where the fifth sample (if any) will be collected. Also, the word "testi" should be changed to "test".

RESPONSE: None of the proposed samples are being eliminated. The intent of the change in paragraph 4 of Section 4.2.2.1 was to clarify that only two samples (4SS4 and 4SS5) will be collected

downgradient of the rubble, as is stated in the rationale column of Table 4-7. A total of 7 surface soil samples are planned for collection as detailed in Table 4-7. Paragraph 4 of Section 4.2.2.1 has been revised to include discussion of all of the surface soil samples. "Testi" has been changed to "test" as requested.

COMMENT: §4.2.2.1, ¶2 If Halliburton NUS's instructions were followed precisely, the comment regarding shading of the tables would replace Section 4.2.2.4, 4.2.3.1, and 4.2.3.2. Clarify that the new sections are intended to replace the existing sections.

RESPONSE: The statement "Shaded areas of the included tables are items of work currently included under another contract and are not part of this Field Sampling Plan." has been removed from the text. The footnote " Shaded areas are not to be completed by Halliburton NUS. " has been added to all tables which contain shaded areas.

COMMENT: Five wells are proposed, but seven terminal depths are given. Clarify which wells will be drilled to 15 feet, which to bedrock, and which into bedrock. Correct Table 4-13 to correspond to text.

RESPONSE: A total of five monitoring wells will be installed at the Spent Acid Storage and Disposal Area as detailed in Table 4-13. Section 4.2.2.4 has been revised to clarify the well depths.

COMMENT: §4.2.2.4, ¶3, lines 5-7 These lines disagree with Table 4-13 regarding what analyses will be conducted on samples 15MW1S and 15GW1S. Please revise.

RESPONSE: Section 4.2.2.4 has been revised. Sample analytes are included in Table 4-13.

COMMENT: §4.2.2.4, ¶3, last line Delete the second "engineering characteristics parameters."

RESPONSE: The deletion has been made as requested

COMMENT: Table 4-13, 15MW1D Change "Bedrock/+/-50" to "Bedrock/50±" to conform with the rest of the table.

RESPONSE: The change has been made as requested.

COMMENT: Table 4-13 The subtotal for water samples should be 5, not 4, because a line was added to account for a water sample from 15MW1D (not 15MW1S as stated in the cover letter). The table and cover letter should be revised to account for these discrepancies.

RESPONSE: The revisions have been made as suggested.

COMMENT: In Footnote 1, the acronym "tclp" should be "TCLP". Change "analyses" to "analysis".

RESPONSE: The changes have been made as suggested.

COMMENT: In Footnote 2, it should be corrected to read, "Subtotal.." rather than "Total..".

RESPONSE: The change has been made as requested

COMMENT: The total for water should include 2 rounds of sampling, so the analyses totalling to 4 should be changed to 10, and the Engineering should total 2 instead of 1.

RESPONSE: The change has been made as requested

COMMENT: A footnote should be added indicating the shaded work will be completed by Atlantic.

RESPONSE: The footnote "Shaded areas are not to be completed by Halliburton NUS" has been added to Table 4-13 as suggested.

COMMENT: Table 4-15 A footnote should be added indicating the shaded work will be completed by Atlantic.

RESPONSE: The footnote "Shaded areas are not to be completed by Halliburton NUS" has been added to Table 4-15 as suggested.

COMMENT: In Footnote 2, it should be corrected to read. "Subtotal.." rather than "Total..".

RESPONSE: The correction has been made as suggested

COMMENT: Because the total number of water samples includes two sampling rounds, the total number of water samples should be 153, and total number of analyses for water needs to be recalculated.

RESPONSE: The total number of samples has been revised to include 150 samples which includes 3 pumping test samples which are to be sampled for one round only.

COMMENT: Under the "Proposed" section, "borings" should be singular, 5 lines from the end of the table.

RESPONSE: The change has been made as suggested

COMMENT: §4.2.3.1, Area A Wetland, ¶1 Justify why the number of sediment samples is being reduced from 33 to 29. According to Table 4-15, samples 2WSD23 through 2WSD26 are being eliminated rather than being completed by Atlantic. To maintain the ratio of field screened samples to lab-analyzed samples, at least nine samples should selected for laboratory analysis rather than six. In addition, two samples should be collected for engineering analysis.

RESPONSE: Four of the samples are not to be collected by Halliburton NUS. The table has been revised to reflect this. Halliburton NUS has been directed by the Navy to send 6 of the samples to the laboratory, one of which will be analyzed for engineering parameters.

COMMENT: §4.2.3.1, Area A Wetland, ¶2 Figure 4-7 needs to be revised to reflect the elimination of four proposed sampling points, if justified, as noted in the previous comment.

RESPONSE: The section has been revised as suggested.

COMMENT: §4.2.3.1, Area A Wetland, ¶5 The number of surface water samples is reduced from 13 to 9, but no corresponding reduction in total number of samples or in work scope (i.e., Atlantic to collect 4 of the samples) is shown on Table 4-15. Please clarify which surface water samples are going to be collected from the Area A Wetland and which are either being eliminated or being collected by Atlantic. If any samples are being eliminated, please provide justification.

RESPONSE: The section has been revised to address the samples which are to be collected by Halliburton NUS. The Tables have been revised to show which samples are to be collected by Halliburton NUS versus samples which will not be collected by Halliburton NUS. None of the samples have been eliminated.

COMMENT: §4.2.3.1, Area A Downstream/OBDA, ¶2 This figure does not delimit the soil-gas survey, though it does show 2DMW15D. Please revise Figure 4-8 to show the expected limits of the proposed soil-gas survey or refer to Plate 1, which does show the expected limits of the soil-gas survey.

RESPONSE: The revision has been made as suggested.

COMMENT: Weapons Center This section has been entirely deleted from Section 4.2.3.1. However, all of the work proposed in this section is shown in Table 4-15 as work to be completed by Halliburton NUS. Please correct either the table or the text, as appropriate.

RESPONSE: The Weapons Center has been added to the text as suggested.

QUALITY ASSURANCE/QUALITY CONTROL AND DATA MANAGEMENT PLAN ADDENDUM

COMMENT:§2.1, ¶2 §2.2, Line 1: Replace "Atlantic" with "Halliburton NUS" in revised text.

RESPONSE: The revision has been made as suggested.

COMMENT: Appendix B Please state if this version of Appendix B is to replace the former version of Appendix B.

RESPONSE: The revision has been made as suggested.

COMMENT: Spent Acid, Water: Correct the number of water samples to read 5.

RESPONSE: The correction has been made as suggested.

COMMENT: Area A, Water: Correct the number of water samples to read 153. Recalculate the number of Field Duplicates, Trip Blanks, Equipment Rinsates, Matrix Spikes, Matrix Spike Duplicates.

RESPONSE: The table has been corrected as suggested. However, 150 water samples are proposed.

COMMENT: Correct the totals for the entire table to reflect the appropriate changes.

RESPONSE: The totals have been corrected as suggested.

NAVAL ENVIRONMENTAL HEALTH CENTER COMMENTS AND HALLIBURTON NUS RESPONSES TO THE HEALTH AND SAFETY PLAN

General Comments

COMMENT 4: The plan does not comply with requirements of either 29 CFR 1910.120 or the Navy/Marine Corps Installation Restoration Manual (February 1992). It contains general, confusing, and incomplete information. We recommend revising the plan to reflect accurate, concise, and site-specific information. Particular attention should be given in developing a thorough, clear hazard analysis for each specific site. Additionally, we recommend careful proof reading to eliminate spelling and punctuation errors and confusing sentence structures. Specific comments are noted below.

RESPONSE: The plan has been revised to reflect accurate, concise, and site-specific information; and to meet the requirements of both 29 CFR 1910.120 and the Navy/Marine Corps Installation Restoration Manual (February 1992). The whole document has been thoroughly reviewed and revised appropriately.

Specific Comments

COMMENT 1: Page 2-1, Section 2.0, "Site/Project Background": This section and Appendix I provide site background information. Consolidating all of the background information in one section would result in a better understanding of the site and the health and safety plan (HASP).

RESPONSE: Appendix I provides a comprehensive overview of all available background information for each individual site. The Appendix was extracted in its entirety from the Atlantic RI Report and the Atlantic RI Work Plan. It was believed to be more cost effective to append the discussion rather than retyping and inserting the discussion in Section 2. It is not necessary in the HASP to repeat information that has already been provided in previous documents, as long as the information is available for review.

COMMENT 2: Page 4-1, Section 4.0, "Hazard Assessment": This hazard assessment should be the backbone of the HASP. A wealth of information is included in this section, but the information is confusingly presented, incomplete, contradictory, and general in nature. Some examples of this are listed below. Recommend revising the entire section and consolidating all information pertinent to each individual site in one location. This should provide a clearer understanding of site-specific conditions and considerations.

RESPONSE: Section 4 has been reviewed and revised as necessary to ensure that information is adequately presented, complete, and specific. The document has been structured to minimize redundancy. Specific comments are addressed below.

COMMENT 2a: The last paragraph on page 4-1 states Table 4-1 presents the planned intrusive tasks. One of the tasks shown on Table 4-1 is "air sampling" which is not intrusive.

RESPONSE: The word "intrusive" has been replaced with the word "work" in the first sentence of the last paragraph on page 4-1.

COMMENT 2b: Personal protective equipment (PPE) is described throughout this section in terms such as "specified items," "standard field dress," and "more stringent PPE requirements." Since the level of PPE has been decided, according to information found in Table 6-2, the specific levels required should be incorporated.

RESPONSE: It is not appropriate to specify PPE in Section 4.0 (Hazard Assessment). Section 4.0 is intended to identify the potential hazards and to identify general methods of hazard control. Specific control procedures are typically identified elsewhere in the HASP. In particular, levels of PPE are identified in Section 6.0. The use of the terms "specified items, standard field dress, and more stringent PPE requirements" are intended to be general in nature for this section.

COMMENT 2c: Table 4-3 is a list of chemical contaminants of concern. The list is in no apparent order. For ease in looking up a particular chemical, recommend alphabetizing the list.

RESPONSE: The contents of Table 4-3 have been listed in alphabetical order.

COMMENT 2d: General contaminant groups are presented on pages 4-23 through 4-25. The usefulness of this information is unclear.

RESPONSE: The general contaminant groups presented on pages 4-23 through 4-25 were deleted as they do not provide significant information over and above that found in other sections of the HASP.

COMMENT 2e: Sub-sections 4.4.6 and 4.4.7 provide information on cold stress and heat stress, respectively. Since this work is scheduled to begin in October, heat stress should not be an issue and should be eliminated from this site-specific document. Additionally, any temperature related hazard prevention program should have some provision for temperature and wind evaluation and PPE. Recommend consulting the American Conference of Governmental Industrial Hygienist's Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices or other industrial hygiene reference for further information on cold or heat stress prevention programs.

RESPONSE: In recognition of the project schedule it has been determined that some project tasks will extend throughout the summer. Therefore, it is inappropriate to remove the discussion on heat stress.

Additional information regarding the recognition, evaluation, and control of heat and cold stress has been added as Appendix III to the HASP.

COMMENT 2f: Material in sub-section 4.4.8 contradicts that in 4.4.8.1.

RESPONSE: The text in section 4.4.8 has been deleted and replaced with the following sentence: "Additional physical hazards are presented below."

COMMENT 2g: On page 4-25, the phrase "Wave form (gamma)" is used. Provide an explanation for this entry. Section 4.4 should include external exposure to ionizing radiation as a physical hazard.

RESPONSE: Page 4-25 has been eliminated from the text. Section 4.4.8.4 has been added to address the radiological hazards associated with this investigation.

COMMENT 3: Page 5-1, Section 5.0, "Air Monitoring": Sub-section 5.1 states that the frequency of monitoring is identified in Section 4.0. If this information exists in Section 4.0, it is not easily discernable. Recommend revising Section 5.0 to include a table showing individual monitoring instruments and frequency of use. The section should also be revised to address personal monitoring. Many of the contaminants of concern listed in Table 4-3 are not measurable by a PID (photoionization detector); a combustible gas meter, an oxygen meter or a radiation meter. Include a methodology by which employee exposure to these substances will be evaluated or explain why this will not be necessary. Recommend including a table listing the action levels at which PPE levels will be altered. Action levels for radiation surveys should include

determining background readings. Sub-section 5.6.2 mentions using colormetric tubes. If this air monitoring method will be used, it should b clearly identified as such.

RESPONSE: Table 5-1 (Monitoring Instruments and Frequency of Use) has been added to Section 5.0 to address monitoring instruments and frequency of use.

It is agreed that many of the contaminants of concern listed in Table 4-3 are not measurable by a PID, LEL/0_2 or radiation survey meter. Site workers will be educated about the warning properties of contaminants and how to recognize symptoms of exposure. They will also be trained to observe these symptoms in others. In addition, Section 5.2 explains that particulate contaminants will be regulated by using engineering controls as a first line of defense to avoid exposure. In the event that engineering controls are ineffective, PPE will be utilized as a second line of defense to shield against exposure.

The action levels for PPE modification are presented in the text in Section 5.6. The use of a Table would be redundant.

A discussion of colorimetric tubes has been added as Section 5.3 of the HASP.

COMMENT 4: Page 6-1, Section 6.0, "Personal Protective Equipment": Based on information from Sections 2.0 and 4.0 the appropriateness of the PPE levels can not be determined. The plan states several times that levels may be upgraded depending on air monitoring results. Good practice dictates that a higher level of protection is initially utilized and downgraded depending on results of the air monitoring. The PPE sections do not contain information on the work mission duration, proper fitting, use and training, inspection procedures, and limitations of PPE in temperature extremes. Recommend reviewing PPE program requirements in references (a) and (b) and revising this section as necessary.

RESPONSE: Previous investigative work has been performed on these sites as evidenced by Appendix I. Information obtained during these investigations was considered sufficient to characterize this site and when determining the appropriate levels of PPE for this scope of work. That information indicated that it is reasonable to begin work in Level D. The monitoring is being performed to make certain that conditions do not change and if they do, the appropriate action or response is executed.

While we concur that good practice dictates the use of a higher level of protection for initial entry, this practice is most appropriate if there is a potential to reach or exceed exposure limits, or when sites are poorly characterized. Overexposure of workers is not considered to be a high risk in the performance of the anticipated work at these sites. We are confident that adherence to the HASP will protect employees from potential overexposure. Based on what is considered an adequate level of information obtained to this point it is assumed that this site is characterized to the level sufficient to make these decisions concerning PPE and control efforts.

Sections 6.4 (PPE maintenance and storage), 6.5 (Training and Fitting of PPE), and 6.6 (work mission/duration) have been added to Section 6.0.

Additional information concerning temperature extremes and applicable monitoring and control measures were not addressed in this section as they were addressed in Section 4.0 of this document.

COMMENT 5: Page 8-1, Section 8.0, "Decontamination": Include level for PPE for employees decontaminating the heavy equipment. Include additional details, such as where the decontamination stations will be set up, how employees will wash their hands and face with potable water in the field, and how the effectiveness of the decontamination will be evaluated.

RESPONSE: PPE for employees decontaminating the heavy equipment will follow the requirements outlined in Section 6.0. and then again in Section 8.4 for clarification (For example, as required by Section 6.2, Saranex will be used for operations that present the potential to saturate work clothes.)

The following statement regarding the location of the decontamination areas has been added to Section 8.1. "The location of this area will be determined by the SSO based on site conditions,emergency response support, and resource resupply, exclusion zone requirements, and prevailing wind direction." It should be noted that a competent and qualified person will make this decision based on, but not limited to, information such as that identified above.

The SSO will coordinate with the facility contact to identify the nearest wash facility.

The effectiveness of the decontamination will be evaluated. Section 8.3 will be added to the HASP to address this issue.

COMMENT 6: Page 9-1, Section 9.0, "Training": No provision is included to maintain copies of employees; training certificates on-site. A minimum of two employees should be certified in first aid and CPR. Recommend adding a method by which visitors to the sites will be briefed on the HASP.

RESPONSE: Provisions have been made in Sections 9.1.1 and 9.1.2 for maintaining copies of training certifications on-site.

A statement has been added to Section 9.2 stipulating the requirements for all visitors. who are required to enter the exclusion zones.

COMMENT 7: Page 10-1, Section 10.0, "Medical Surveillance": It is unclear of Halliburton NUS Corporation (Halliburton NUS) will follow the same criteria that is required of the contractor (e.g., provide the physician a description of the employees' anticipated duties, a list of suspected contaminants, and a description of PPE). Reference (b) paragraph 12.6.4 requires examinations be performed under the supervision of a certified occupational medicine physician. Provision for this specialty should be included in this section.

RESPONSE: All Halliburton NUS employees who perform work on hazardous waste sites participate in a medical surveillance program designed to meet the requirements of 1910.120 and 1910.134 as stated in Section 10.1. Halliburton NUS physicians meet the requirements of the OSHA regulations and are certified occupational medicine physicians. All of these requirements are incorporated by reference in Sections 10.1 and 10.2. No changes have been made to this section.

COMMENT 8: Page 11-1, Section 11.0, "Site Control": Provide specific site descriptions and site maps for this section.

RESPONSE: These items are already provided. No additional response to this comment is necessary. Specific site descriptions are provided in Appendix I. Site maps are included in the Work Plan which will be maintained on site.

COMMENT 9: Page 13-1, Section 13.0, "Emergency Response Plan": Figure 13.1 contains a list of emergency phone numbers, several of which are incorrect. Phone numbers for the Naval On-Scene Commander (NOSCDR) or the Naval On-Scene Coordinator (NOSC), the Agency for Toxic Substances and Disease Registry (ATSDR), a recognized authority on emergency response, or a certified Poison Control Center were not included. None of the emergency facilities had been contacted to determine their capabilities of handling potential chemical contamination. The basis under which the Navy Medical Department is to provide medical care is not stated (i.e., whether or not contractor personnel are to be rendered assistance under civilian humanitarian rules or by other agreement). There is no indication that the military ambulance crew has been trained to respond to potential hazardous waste site emergencies or that a point of contact within the Navy Medical Department has been provided technical information about the potential chemical hazards. The map provided in Figure 13-2 is not readable. Recommend careful review of reference (a) paragraph (l) and revising this section to reflect all of the regulatory requirements.

Verify all phone numbers and coordinate with listed organizations prior to the start o work. Include a clear copy of a map and indicate on the map the medical treatment facilities (both military and civilian).

RESPONSE: Emergency phone numbers for the Navy Base were obtained from Dick Conant, the site contract. Incorrect numbers have been changed in the HASP. Local off-site emergency numbers were verified. In addition, ATSDR was added as a source of information.

As stated in Section 13.8, The Navy Medical Department will provide care to civilians if it is a matter of "Life or Death". This information has been verified by Dick Conant.

According to the Navy site contact, the military ambulance crew is trained in Hazardous Waste Emergency Response. A statement indicating this fact has been added to Section 13.8

The Navy Medical Department will be provided with a copy of the HASP. In addition, Navy response personnel will be invited to attend the site specific training.

A statement has been added to indicate that two members of the field team are required to drive the route to the hospital prior to the start of work.

As specified in the introduction of this section, paragraph I of the cited reference is not applicable in this HASP. The emergency response plan in Section 13.0 of this HASP was developed in accordance with the requirements of 29 CFR 1910.38 (a).

COMMENT 10: Appendix I, "Site Descriptions": Recommend combining pertinent information from this appendix with Section 2.

RESPONSE: Please see the Halliburton NUS response to Comment #1.

COMMENT 11: Appendix II, "Management of Investigation-Derived Wastes During Site Inspections": A wealth of information is contained in this appendix, but the usefulness of it for this project is unclear. Recommend reducing applicable sections to a standard operating procedure and including this in the HASP.

RESPONSE: Reference to the "Management of Investigation - Derived Wastes During Site Inspections" will be removed from the HASP. The specific procedures necessary in regard to IDW issues are site and task specific and can vary as site conditions and occurrences unfold. It will be the responsibility of the Field Operations Leader to utilize proper management techniques and procedures for IDW. This is addressed in greater detail in the Work Plan.

COMMENT 12: Since Halliburton NUS employees may be expected to perform first aid, a Bloodborne Pathogen Program in accordance with 29 CFR 1910.1030 needs to be developed and included in the HASP.

RESPONSE: The Halliburton NUS field team will not perform first aid functions but will rely on Base support.

PLANNING DOCUMENTS ADDENDUM

INTRODUCTION

This addendum to the Phase II Remedial Investigation (RI) Planning Documents has been prepared by Halliburton NUS under Clean Contract Number N62472-90-D-1298, Contract Task Order (CTO) 129. The Phase II RI Planning Documents consist of four documents: A Work Plan, Field Sampling Plan, Health and Safety Plan, and Quality Assurance/Quality Control and Data Management Plan. The original planning documents were prepared by Atlantic Environmental Services, Incorporated (Atlantic) under Navy Contract Number N62472-88-C-1294 during a comprehensive remedial investigation effort.

The addendum follows the same format as each of the four plans and identifies sections which require modification. The reader will be required to have the Atlantic Phase II RI Plans dated May 1993 in his/her possession while using this document. The only exception is the Health and Safety Plan which was re-written by Halliburton NUS in order to conform to both our interpretation of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response Standard, and CLEAN contract requirements.

All sections of the plans have been addressed, including those in which no change occurred, and are designated "No amendments of Section __ are necessary." Text and Tables that were revised significantly have been included to be inserted into the appropriate sections of the Atlantic Plans. Note that the shaded portions of the addendum denotes work which is being performed by Atlantic as defined in their Proposed Interim Remedial Action Plan dated March 23, 1993.

The purpose of this addendum is to define the specific activities for which Halliburton NUS will be responsible, in addition to making the necessary modifications as the result of Halliburton NUS performing the Phase 2 activities. While this addendum has been written to account for work at 13 areas, funding constraints currently limit the work to three areas which are as follows:

- Area A Wetland
- Area A Downstream/OBDA
- Thames River

Work at the remaining 13 areas will be conducted as soon as funding is available.

WORK PLAN ADDENDUM

1.0 INTRODUCTION

No amendments of Section 1 are necessary.

2.0 EVALUATION OF EXISTING DATA

No amendments of Section 2 are necessary.

3.0 SITE DYNAMICS

No amendments of Section 3 are necessary.

4.0 HUMAN HEALTH AND RISK

No amendments of Section 4 are necessary.

5.0 ECOLOGICAL RISK ASSESSMENT WORK PLAN

No amendments of Section 5 are necessary.

6.0 PRELIMINARY IDENTIFICATION OF REMEDIAL ACTION ALTERNATIVES

No amendments of Section 6 are necessary.

7.0 REMEDIAL INVESTIGATION AND FEASIBILITY OBJECTIVES

Delete Section 7 in its entirety and replace with the attached revised Section 7.

8.0 DATA QUALITY OBJECTIVES

No amendments of Section 8 are necessary.

9.0 REMEDIAL INVESTIGATION/FEASIBILITY STUDY TASKS

Section 9.1, delete the eighth through eleventh bullets in their entirety.

Section 9.1.2, delete in its entirety and replace with the following: Public meetings will normally be held in the evening on the same day as TRC meetings. To keep the public informed, a fact sheet announcing the results of the Remedial Investigation will be completed.

Section 9.1.8 delete in its entirety. This work is to be performed under separate contract.

Section 9.1.9, delete in its entirety. This work is to be performed under separate contract.

Section 9.1.10, delete in its entirety. This work is to be performed under separate contract.

Section 9.1.11, delete in its entirety. This work is to be performed under separate contract.

10.0 SCHEDULE

Delete Figure 10-1 and replace with the revised Figure 10-1 attached.

11.0 PROJECT MANAGEMENT

Delete Section 11 in its entirety and replace with the attached revised Section 11.

DRAWINGS

Plate 1, delete and replace with the revised Plate 1 attached.

Revised Section 7

7.0 REMEDIAL INVESTIGATION AND FEASIBILITY OBJECTIVES

The Step II Remedial Investigation/Feasibility Studies involve sites which have undergone an initial (i.e., Step I) field sampling/analysis program in which contamination was determined to be present. Step II investigations include comprehensive site studies designed to determine the nature and extent of contamination, to assess associated health and environmental risks and to conduct feasibility studies to evaluate remedial (cleanup) options.

Supplemental Step II Remedial Investigations involve sites that have undergone Step II investigations for which further supplemental information is required. This information is needed to further define the extent of contamination and further assess health and ecological risks in order to allow completion of the Feasibility Study. Specific items included in the supplemental investigation were either recommendations of the Phase I RI or requests of the Technical Review Committee.

The overall goals of the RI are to:

- Conduct a field investigation program for collecting data to further quantify the nature and extent of contamination in the ground water, surface and subsurface soils, surface water/sediments, and air (as applicable).

- Develop base-wide ground water contour and bedrock elevation maps using information collected from each of the sites, as well as outcrop information, and any other readily available information.

- Determine if unacceptable risk exists to human health or the environment.

The following sections describe site-specific objectives of the remedial investigation for each site. The human health and ecological risk assessment investigation plan objectives are provided in Sections 4.0 and 5.0 and are not repeated herein. Also provided are summary tables which specify RI objectives and actions, chemical constituent selection rationale, and site sampling plan summary tables. Figures illustrating existing and proposed sample locations are provided for each site.

This section provides a general overview of the work to be evaluated. Specific details of the field investigation, including protocols and procedures, are provided in the Field Sampling Plan.

7.1 Supplemental Step I Investigations

7.1.1 CBU Drum Storage Area

The specific goals of this investigation include the overall goals listed in Section 7.0 and the following:

- Collect supplemental analytical data to confirm that contaminants are not present at levels of concern.
- Determine the nature of any hazardous substances in soil.
- Determine if hazardous substances are present in ground water.
- Collect data for a qualitative human health risk assessment.

The remedial investigation objectives and associated investigative actions are included in Table 7-1. The rationale for selection of constituents for analysis is provided in Table 7-2. Table 7-3 provides details of the field sampling plan, including location, number and type of samples, location rationale, and analysis requirements.

Figure 7-1 illustrates the proposed sample locations.

The general approach to be used in this investigation is presented below. Preliminary investigations identified relatively low levels of VOCs, SVOCs, total petroleum hydrocarbons, and metals in some of the samples. The pesticide DDD was also detected in one of the samples. The supplemental Step I investigation is designed to further confirm that chemical contaminants are not present at levels of concern. The investigations will assess whether contamination has impacted deeper soils and ground water in the former drum storage area. The field program will consist of a series of soil borings, the installation of a monitoring well, and collection of soil (surface and subsurface) and ground water samples for chemical analysis. Test borings will be drilled for geologic and chemical characterization of subsurface media and fill materials. The monitoring well will be installed to assess site ground water quality.

7.1.2 OBDANE

The site-specific goals of this investigation include the overall goals listed in Section 7.0 and the following:

- Collect supplemental analytical data to confirm that contaminants are not present at levels of concern.
- Determine the nature of any hazardous substances in soil.

TABLE 7-1
CBU DRUM STORAGE AREA
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations and other geologic features. /Geologic features have not been completely mapped.	Use existing site survey maps to draft site maps using AutoCAD®. Survey sample locations and elevations.
Geologic Investigation	Characterize stratigraphy of overburden. Characterize the physical nature of fill materials in the CBU Drum Storage Area. /No information regarding stratigraphy of overburden has been collected in this area.	Perform a series of test borings; collect continuous core samples.
Hydrogeologic Investigation	Determine appropriate screen interval for shallow well. /Depth to groundwater in this area has not been fully characterized.	Determine stratigraphy/depth to ground water from test borings.
	Characterize the shallow hydrogeologic unit. /The shallow hydrogeologic unit has not been characterized for this specific location.	Locate one well in the CBU Drum Storage Area and utilize proposed well 4MW1S as an upgradient well.
	Supplement existing information in order to further define ground water flow direction and estimate gradients. /Ground water flow has not been fully characterized for this specific site.	Perform ground water elevation measurements prior to each round of sampling. Collect data to prepare a base-wide ground water elevation map.
Chemical Investigation Soils	Confirm lack of surface soil contamination; collect health risk data. /Surface soil quality has not been adequately characterized.	Collect and analyze surface soil samples from within the CBU Drum Storage Area. Plot or contour concentrations of chemicals of concern on site maps.
	Confirm lack of subsurface soil contamination. Characterize the chemical nature of fill materials within the Drum Storage Area; collect health risk data. /Subsurface sampling has not been conducted at the site.	Install a series of test borings, within the drum storage area. Collect and analyze a subsurface soil sample from each boring.
Ground Water	Determine ground water quality within drum storage area; collect health risk data. /Ground water quality has not been determined at this site.	Install a monitoring well within the drum storage area. Sample and analyze the ground water for constituents of concern.
	Evaluate potential temporal changes in ground water quality. /Ground water quality has not been determined at this site.	Perform two rounds of ground water sampling and analysis.
Engineering Investigation	No objectives have been defined as this is a Step I investigation.	None required.

TABLE 7-2
CBU - DRUM STORAGE AREA
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	VOCs were detected in previously collected surface soil samples.
SVOC[2]	●	SVOCs were detected in previously collected surface soil samples.
Inorganic[3]	●	Elevated lead concentrations were detected in previously collected surface soils.
Pesticides	●	The pesticide DDD was detected in a previously collected surface soil sample.
PCB[4]	●	Not detected in Step I Study, regardless PCB will be tested for as possibly waste materials stored in this area contained PCB.
TCLP[5]	●	Determine leaching potential of metals in soils.
Radiological[6]		Further ground water analyses are being performed at Area A.
Dioxin[7]		Historically, neither petroleum products nor chlorinated compounds have been burned at this site and dibenzofuran was not detected during the Step I investigation.
Engineering Characteristics[8]		Feasibility study data requirements not necessary at this time.
TPH[9]	●	Useful in assessing petroleum contamination.

Notes:

1. VOC means volatile organic compound listed in the CLP TCL.
2. SVOC means semi-volatile organic compound listed in the CLP TCL.
3. Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.
4. PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.
5. TCLP means toxicity characteristic leaching procedures (Analysis to be performed for metals only).
6. Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.
7. Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.
8. Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).
9. TPH = Total Petroleum Hydrocarbons

TABLE 7-3
CBU DRUM STORAGE AREA FIELD SAMPLING PLAN

Sample Location	Well Depth/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]							
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TPH	TCLP[3]	Engineering
Monitoring Well													
1MW1S	Overburden/20±	Monitor quality of ground water and test for subsurface soil contamination within the CBU Drum Storage Area.	1MW1S (0-2')	1		1	1	1	1	1	1	1	
			1MW1S (depth)	1		1	1	1	1	1	1	1	
			1GW1S		1	1	1	1	1	1	1		
Test Borings													
1TB1	NA/15'	Further evaluate potential subsurface soil contamination.	1TB1 (0-2')	1		1	1	1	1	1	1		
			1TB1 (depth)	1		1	1	1	1	1	1		
1TB2	NA/15'	Further evaluate potential subsurface soil contamination.	1TB2 (0-2')	1		1	1	1	1	1	1		
			1TB2 (depth)	1		1	1	1	1	1	1		
			Total Soils	**6**		**6**	**6**	**6**	**6**	**6**	**6**	**2**	**0**
			Total Water[4]		**2**	**2**	**2**	**2**	**2**	**2**	**2**	**0**	**0**

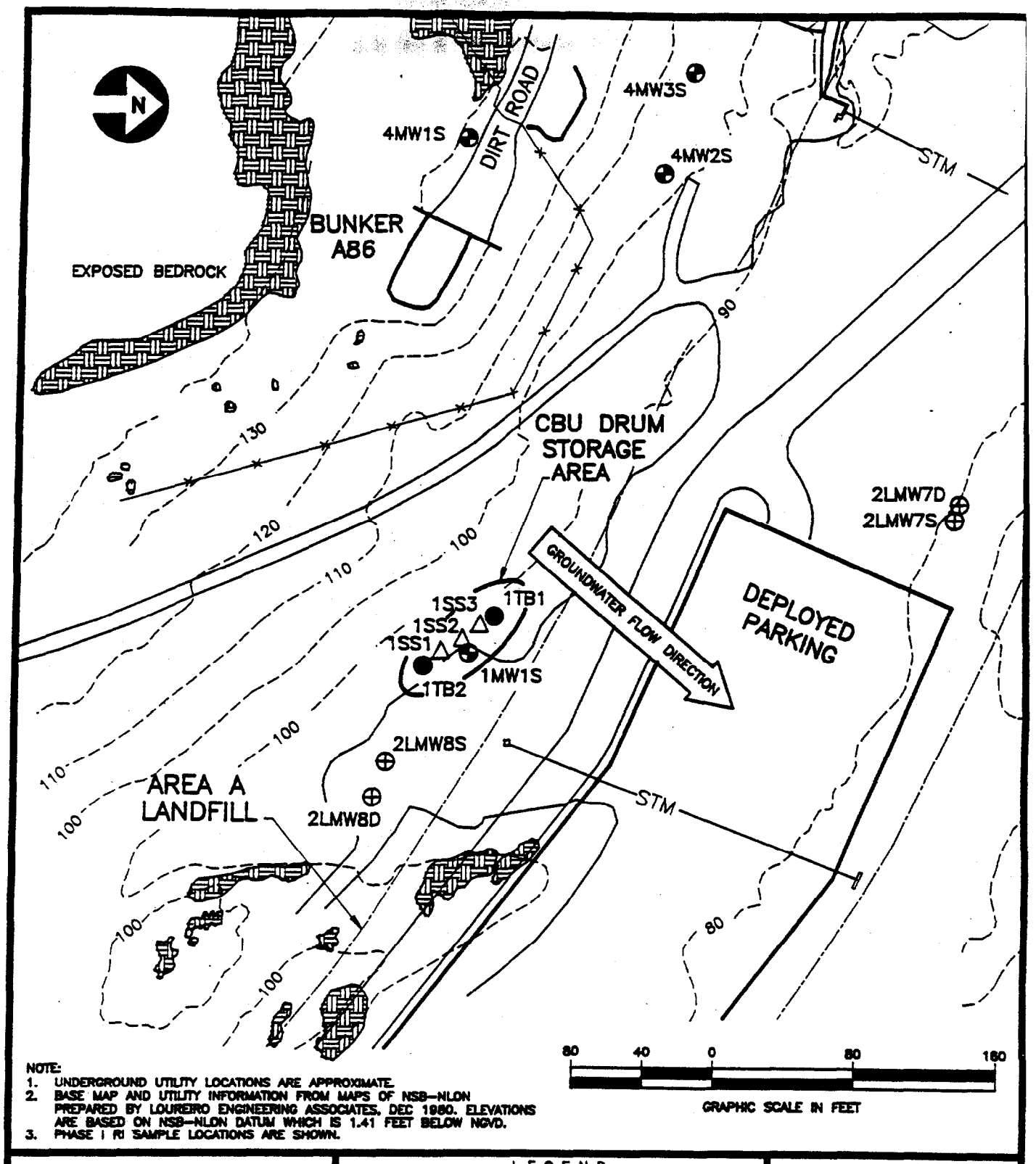
PROPOSED

3 Test borings (including 1 well boring)

1 Well

Notes:

1. Rinsate blanks are to be analyzed for all analytical parameters for which analyses are shown.
2. TAL Metals plus Boron. Groundwater samples are to be analyzed for both total and dissolved TAL metals and Boron. Surface waters are to be analyzed for dissolved TAL metals and Boron only.
3. Except for one sample obtained from the Spent Acid Storage and Disposal Area; and two samples obtained from the Lower Subase; all TCLP analyses indicated are for TCLP-extract metals.
4. Total includes two sampling rounds.



NOTE:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON PREPARED BY LOUREIRO ENGINEERING ASSOCIATES, DEC 1980. ELEVATIONS ARE BASED ON NSB–NLON DATUM WHICH IS 1.41 FEET BELOW NGVD.
3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE – NEW LONDON
GROTON, CT

LEGEND

EXIST.	PROP.	
6MW1	6MW5	MONITORING WELL
6TB1	6TB5	TEST BORING
22SD1	22SD5	SEDIMENT SAMPLE
6SS1	7SS5	SURFACE SOIL SAMPLE
22SW1	22SW5	SURFACE WATER SAMPLE

—10—	EXIST CONTOUR
123	BUILDING No.
	WATERCOURSE
—STM—	STORM SEWER
	CATCH BASIN

FIGURE 7–1
FIELD SAMPLING PLAN
CBU DRUM STORAGE AREA

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- Determine if hazardous substances are present in ground water.

- Collect data for a qualitative human health risk assessment.

The remedial investigation objectives and associated investigative actions are included in Table 7-4. The rationale for selection of constituents for analysis is provided in Table 7-5. Table 7-6 provides details of the field sampling plan including location, number and type of samples, location rationale, and analysis requirements.

Figure 7-2 illustrates the proposed sample locations.

The general approach to be used in this investigation is presented below. Preliminary investigations identified tetrachloroethene at a very low concentration. There were no other compounds identified at the site above background values. The supplemental Step I investigation is designed to further confirm that chemical contaminants are not present at levels of concern. The investigation will assess whether contamination has impacted deeper soils and ground water in the OBDANE area. The field program will consist of a series of soil borings, the installation of a monitoring well, and collection of soil (surface and subsurface) and ground water samples for chemical analysis.

Test borings will be drilled for geologic and chemical characterization of subsurface media and fill materials. The monitoring well will be installed to assess site ground water quality.

7.2 Step II Investigations

7.2.1 Rubble Fill at Bunker A-86

The specific goals of this investigation include the overall goals listed in Section 7.0 and the following:

- Determine the source, nature and extent of chlorinated solvents, arsenic, pesticides and PAH contamination in soil, ground water and surface water.

- Determine the extent of fill material based on visual observations.

- Collect human health risk assessment data.

- Characterize site geology, including depth to bedrock.

- Define ground water hydrology.

TABLE 7-4
OVER BANK DISPOSAL AREA NORTHEAST (OBDANE)
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations and other geologic features. /Geologic features have not been completely mapped.	Use existing site survey maps to draft site maps using AutoCAD®. Survey sample locations and elevations.
Geologic Investigation	Characterize stratigraphy of overburden. Characterize the physical nature of fill materials in the OBDANE Area. /No information regarding stratigraphy of overburden has been collected in this area.	Perform a series of test borings; collect continuous core samples.
Hydrogeologic Investigation	Determine appropriate screen interval for shallow well. /Depth to ground water has not been determined.	Determine stratigraphy/depth to ground water from test borings.
	Characterize the shallow hydrogeologic unit. /The shallow hydrogeologic unit has not been characterized for this specific location.	Locate one well in the OBDANE Area and utilize existing well in the area as upgradient well.
	Supplement existing information in order to further define ground water flow direction and estimate gradients. /Ground water flow direction information for this area has not been measured at this site.	Perform ground water elevation measurements prior to each round of sampling. Collect data to prepare a base-wide ground water elevation map.
Chemical Investigation Soils	Confirm lack of surface soil contamination; collect health risk data. /Surface soil quality has not been fully characterized.	Collect and analyze surface soil samples from within the OBDANE area. Plot or contour concentrations of chemicals of concern on site maps.
	Confirm lack of subsurface contamination. Characterize the chemical nature of fill materials within the OBDANE area; collect health risk data. /Subsurface soil sampling has not been conducted at this site.	Install a series of test borings, within the OBDANE area. Collect and analyze a subsurface soil sample from each boring.
Ground Water	Determine ground water quality within OBDANE Area; collect health risk data. /Ground water quality has not been determined at this site.	Install a monitoring well within the OBDANE area. Sample and analyze the ground water for constituents of concern.
	Evaluate potential temporal changes in ground water quality. /Ground water quality has not been determined at this site.	Perform two rounds of ground water sampling and analysis.
Engineering Investigation	No objectives have been identified as this is a Step I investigation.	None required.

TABLE 7-5
OBDANE AREA
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Tetrachloroethene was detected in a previously collected surface soil sample.
SVOC[2]	●	Included for completeness.
Inorganic[3]	●	Included for completeness.
Pesticides	●	Not detected in Step I Investigation.
PCB[4]		Not detected in Step I Investigation.
TCLP[5]	●	Determine leaching potential of metals in soils.
Radiological[6]		Further ground water analysis are being performed at Area A.
Dioxin[7]		Historically, neither petroleum products nor chlorinated compounds have been burned at this site and dibenzofuran was not detected during the Step I investigation.
Engineering Characteristics[8]		Feasibility study data requirements not necessary at this time.

Notes:

1. VOC means volatile organic compound listed in the CLP TCL.
2. SVOC means semi-volatile organic compound listed in the CLP TCL.
3. Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.
4. PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.
5. TCLP means toxicity characteristic leaching procedures (analysis to be performed for metals only).
6. Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.
7. Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.
8. Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).

TABLE 7-6
OBDANE FIELD SAMPLING PLAN

Sample Location	Well Depth/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]						
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	Engineering
Monitoring Well												
14MW1S	Overburden/20±	Monitor quality of ground water and test for subsurface soil contamination within the OBDANE area.	14MW1S (0-2')	1		1	1	1			1	
			14MW1S (depth)	1		1	1	1			1	
			14GW1S		1	1	1	1				
Test Borings												
14TB1	NA/15'	Further evaluate potential subsurface soil contamination.	14TB1 (0-2')	1		1	1	1				
			14TB1 (depth)	1		1	1	1				
14TB2	NA/15'	Further evaluate potential subsurface soil contamination.	14TB2 (0-2')	1		1	1	1				
			14TB2 (depth)	1		1	1	1				
Sediment Samples												
14SS3	0-6"	To determine if contaminants have accumulated in low spot downgradient of OBDANE.	14SS3 (0-6")	1		1	1	1	1			
			Total Soils	7		7	7	7	1	0	2	0
			Total Water[4]		2	2	2	2	0	0	0	0

PROPOSED

3 Test borings (including 1 well boring)

1 Well

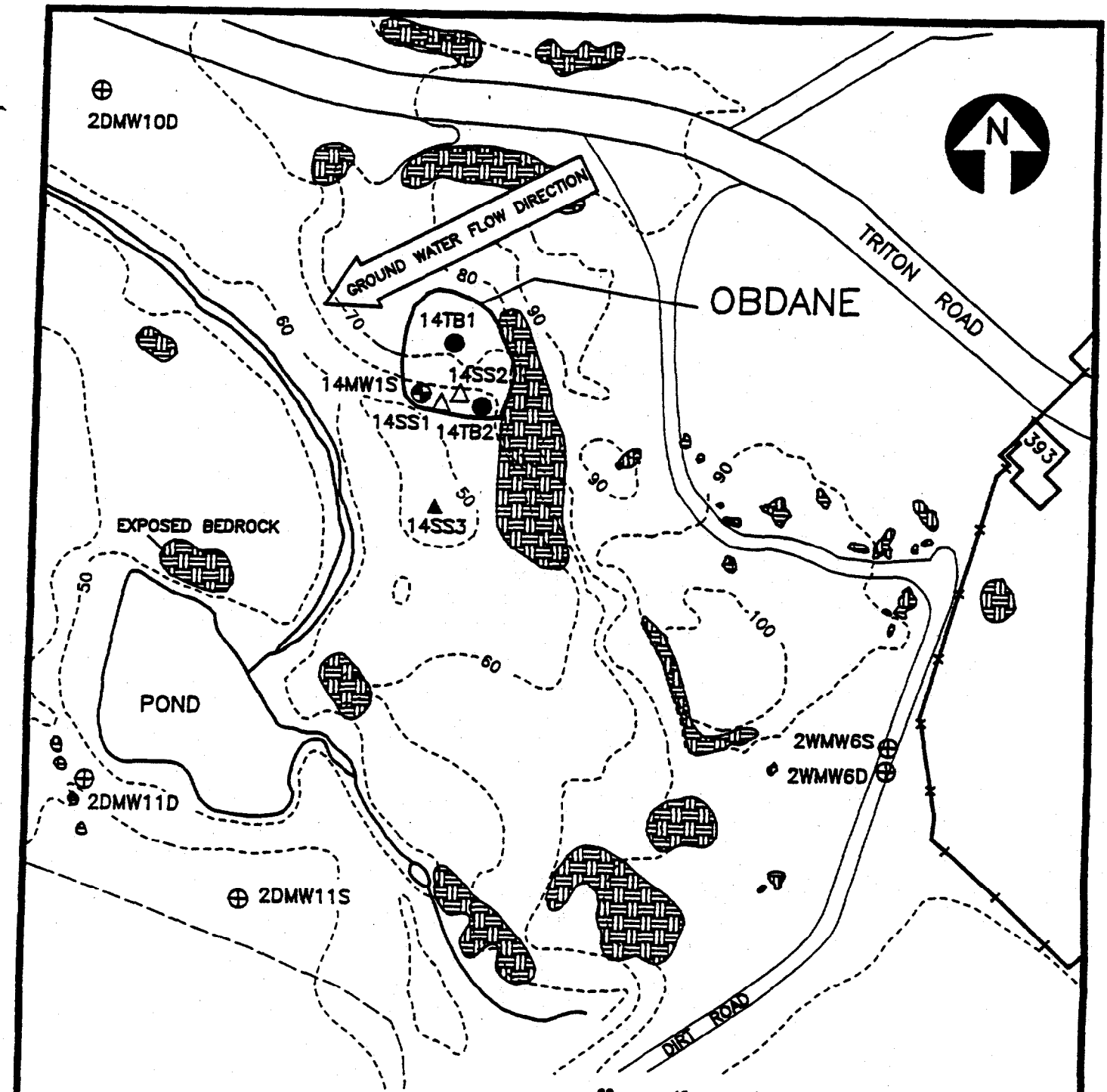
Notes:

(1) Rinsate Blanks are to be analyzed for all analytical parameters for which analyses are shown.

(2) TAL metals plus Boron. Groundwater samples are to be analyzed for both total and dissolved total TAL metals and Boron. Surface waters are to be analyzed for dissolved TAL metals and Boron only.

(3) Except for one sample obtained from the Spent Acid Storage and Disposal Area; and two samples obtained from the Lower Subase; all TCLP analyses indicated are for TCLP - extract metals only.

(4) Total includes two sampling rounds.



NOTE:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON PREPARED BY LOUREIRO ENGINEERING ASSOCIATES, DEC 1980. ELEVATIONS ARE BASED ON NSB–NLON DATUM WHICH IS 1.41 FEET BELOW NGVD.
3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE – NEW LONDON
GROTON, CT

LEGEND

EXIST.	PROP.	
⊕ 6MW1	⊕7MW6	MONITORING WELL
○ 6TB1	●7TB6	TEST BORING
□ 22SS01	■22SS06	SEDIMENT SAMPLE
△ 6SS1	▲7SS3	SURFACE SOIL SAMPLE
◇ 22SW01	◆22SW06	SURFACE WATER SAMPLE

---10--- EXIST CONTOUR
123 BUILDING No.
WATERCOURSE
—STM— STORM SEWER
□ CATCH BASIN

FIGURE 7–2
FIELD SAMPLING PLAN
OBDANE

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The remedial action objectives and associated investigative actions are included in Table 7-7. The rationale for selection of constituents for analysis is provided in Table 7-8. Table 7-9 provides details of the field sampling plan including location, number and type of samples, location rationale, and analysis requirements.

Figure 7-3 illustrates the proposed sample locations.

The general approach to be used in this investigation is presented below. Preliminary investigations identified trace concentrations of VOCs and low to moderate levels of PAH compounds, arsenic, and pesticides in surface soil samples collected immediately downgradient of the rubble fill area. Of particular concern from a health risk perspective is the arsenic detected in surficial soils. The Step II investigation is designed to assess whether contamination has impacted deeper soils and ground water in the vicinity, assess the extent of surface soil contamination, and assess whether surficial contaminants are being carried offsite in surface water runoff. The field program will consist of a series of soil borings, installation of monitoring wells, and collection of soil (surface and subsurface), surface water, ground water, and sediment samples for chemical analysis. The investigation will focus on the rubble fill area and immediate vicinity and attempt to delineate the vertical and lateral extent of any contamination associated with it. The extent of fill will be determined by visual observations, and its depth will be determined by a soil boring. Test borings will be drilled for geologic and chemical characterization of subsurface media and fill materials. The monitoring wells (overburden and/or bedrock, depending upon proximity of the uppermost water-bearing unit) will be installed to assess site ground water quality and evaluate site ground water hydrology.

7.2.2 Torpedo Shops

The site investigation's specific goals include the overall goals listed in Section 7.0 and the following:

- Determine the source, nature and extent of VOC and antimony contamination in soil, ground water, sediments and surface water.
- Determine the extent of Otto fuel leakage.
- Collect human health risk assessment data.
- Further define site geology and hydrology.

The remedial action objectives and associated investigative actions are included in Table 7-10. The rationale for selection of constituents for analysis is provided in Table 7-11. Table 7-12 provides details of the field sampling plan including location, number and type of samples; location rationale; and analysis requirements.

Figure 7-4 illustrates the proposed sample locations.

TABLE 7-7
RUBBLE FILL AT BUNKER A-86
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations and other geologic features. /Proposed sample locations and some geologic features have not been located.	Use existing site survey maps to draft site maps using AutoCAD®. Survey sample locations and elevations.
Geologic Investigation	Characterize stratigraphy of overburden and depth to bedrock. Characterize the physical nature of fill materials in the rubble fill area. /No site-specific information regarding stratigraphy at the site exists.	Perform a series of test borings; collect continuous core samples. Core 5 feet into bedrock at 4MW4D.
Hydrogeologic Investigation	Determine appropriate screen interval for shallow wells. /No site-specific information regarding depth to ground water at the site exists.	Determine stratigraphy/depth to ground water from test borings.
	Characterize the shallow hydrogeologic unit. /No specific site-specific information exists regarding ground water flow direction at the site.	Locate monitoring wells up- and downgradient of rubble fill area.
	Further define ground water flow direction and estimate gradients. /No site-specific information exists regarding ground water flow direction at the site.	Perform ground water elevation measurements prior to each round of sampling. Collect data to prepare a base-wide ground water elevation map.
	Determine ground water flow rates. /No site-specific information exists regarding ground water flow rates at the site.	Perform hydraulic conductivity tests on one well (4MW2).
Chemical Investigation Soils	Determine nature and extent of surface soil contamination, particularly with regard to arsenic; health risk data. /Only limited information regarding surface soil contamination has been collected at the site. The extent of arsenic contamination has not been determined.	Collect and analyze series of surface soil samples around rubble fill area. Plot or contour concentrations of chemicals of concern on site maps.
	Determine nature, extent, and degree of subsurface soils contamination, particularly PAH contaminants. Characterize the chemical nature of fill materials within the rubble fill area; health risk data. /No subsurface soil information has been collected at the site.	Install a series of test borings, one in center of rubble fill area, and others downgradient. Collect and analyze a subsurface soil sample from each boring.
Ground Water	Determine nature, extent, and degree of ground water contamination; health risk data. /No ground water analytical information exists at the site.	Install monitoring wells to determine extent of contaminant plume, if any. Sample and analyze all wells for constituents of concern.
	Identify upgradient ground water quality. /No ground water analytical information exists at the site.	Sample and analyze upgradient well for constituents of concern.

TABLE 7-7 (Continued)
RUBBLE FILL AT BUNKER A-86
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Surface Water and Sediment	Evaluate potential temporal changes in ground water quality. /No ground water analytical information exists at the site.	Perform two rounds of ground water sampling and analysis.
	Evaluate surface water and sediment chemical quality in nearby surface drainage. Determine if contaminants are being transported offsite by these mechanisms. /No information exists regarding sediment and surface water quality at the site.	Sample and analyze surface water and sediment from one location upgradient and one location downgradient of fill area.
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study evaluation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil and ground water samples for specified engineering characteristic parameters.

TABLE 7-8
RUBBLE FILL AT BUNKER A-86
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Chlorinated solvents were detected in two previous surface soil samples. Study area not adequately characterized for this parameter.
SVOC[2]	●	Detected in composite surface soil sample. Study area not adequately characterized for this parameter.
Inorganics[3]	●	High arsenic concentration detected in composite surface soil sample. Study area not adequately characterized for this parameter.
Pesticides	●	Pesticides (BHC and methoxychlor) detected in composite surface soil sample. Study area not adequately characterized for this parameter.
PCB[4]	●	Study area not adequately characterized for this parameter.
TCLP[5]	●	Determine hazardous characteristics for selected samples.
Radiological Analyses[6]		Further ground water analyses are being performed at Area A.
Dioxin[7]		Historically, neither petroleum products nor chlorinated compounds have been burned at this site and dibenzofuran was not detected during Step I investigations.
Engineering Characteristics[8]	●	Feasibility study data requirements for select samples.

Notes:

1. VOC means volatile organic compound listed in the CLP TCL.
2. SVOC means semi-volatile organic compound listed in the CLP TCL.
3. Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.
4. PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.
5. TCLP means toxicity characteristic leaching procedures.
6. Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.
7. Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.
8. Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).

TABLE 7-9
RUBBLE FILL AT BUNKER A-86 FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth	Rationale	Sample Designations	Sample Type		Analysis[1]						
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	Engineering[4]
Monitoring Wells												
4MW1S[5]	Overburden/20±' (Bedrock well installed if no overburden aquifer)	Monitor quality of shallow ground water and test for subsurface soil contamination upgradient of Rubble Fill area.	4MW1S (0-1')	1		1	1	1	1	1		
			4GW1S		1	1	1	1	1	1		
4MW2S[5]	Overburden/20±' (Bedrock well installed if no overburden aquifer)	Monitor quality of shallow ground water and test for subsurface soil contamination downgradient of Rubble Fill area.	4MW2S (depth)	1		1	1	1	1	1		1
			4GW2S		1	1	1	1	1	1		
4MW3S[5]	Overburden/20±' (Bedrock well installed if no overburden aquifer)	Monitor quality of shallow ground water and test for subsurface soil contamination downgradient, northwest of Rubble Fill area.	4MW3S (depth)	1		1	1	1	1	1		1
			4GW3S		1	1	1	1	1	1		1
4MW4S[5]	Overburden/20±'	Monitor quality of shallow ground water and test for subsurface soil contamination downgradient, northwest of Rubble Fill area.	4MW4S (depth)	1		1	1	1	1	1		
			4GW4S		1	1	1	1	1	1		
4MW4D[5]	Bedrock	Monitor quality of deep ground water and test for subsurface soil contamination downgradient, northwest of Rubble Fill area.	4GW4D		1	1	1	1	1	1		
Test Borings												
4TB1	NA/Bedrock (20±')	Determine stratigraphy/nature of fill material in center of Rubble Fill area. Determine nature and extent of subsurface soil contamination in potential source area.	4TB1 (depth)	1		1	1	1	1	1	1	
4TB2	NA/Bedrock (20±')	Further define extent of subsurface soil contamination northeast of Rubble Fill area.	4TB2 (0-1)	1		1	1	1	1	1	1	
4TB3	NA/Bedrock (20±')	Further define extent of subsurface soil contamination northeast of Rubble Fill area.	4TB3 (depth)	1		1	1	1	1	1		
			Subtotal Soil	7		7	7	7	7	7	2	2
			Subtotal Water/1 Sampling Round		5	5	5	5	5	5	0	1
Surface Soil Sampling												
4SS4	Surficial	Determine nature and extent of surface soil contamination downgradient of Rubble Fill area.	4SS4 (0-6")	1		1	1	1	1	1		
4SS5	Surficial	Further define extent of surface soil contamination downgradient of Rubble Fill area.	4SS5 (0-6")	1		1	1	1	1	1		
4SS6	Surficial	Assess surface soil quality in Rubble Fill area.	4SS6 (0-6")	1		1	1	1	1	1		

TABLE 7-9 (continued)
RUBBLE FILL AT BUNKER A-86 FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth	Rationale	Sample Designations	Sample Type		Analysis[1]						
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	Engineering[4]
4SS7	Surficial	Determine nature and extent of surface soil contamination east of Rubble Fill area west of Bunker.	4SS7 (0-6")	1		1	1	1	1	1		
4SS8	Surficial (0-1')	Determine nature and extent of surface soil contamination northwest of Rubble Fill area.	4SS8 (0-6")	1		1	1	1	1	1		
4SS9	Surficial	Assess surface soil quality in Rubble Fill area.	4SS9 (0-6')	1		1	1	1	1	1		
4SS10	Surficial	Assess surface soil quality in Rubble Fill area.	4SS10 (0-6")	1		1	1	1	1	1		
		Subtotal Surface Soils		7		7	7	7	7	7	0	0
Surface Water/Sediment Sampling												
4SW1/SD1	-	Generate chemical data for surface water and sediments from surface drainage upgradient of Rubble Fill area to determine contaminant loading.	4SW1[7]		1	1	1	1	1	1		
			4SD1	1		1	1	1	1	1		1
4SW2	-	Upgradient of wetland at stormwater outlet that passes by Rubble Fill at Bunker A-86.	4SW2[7]		1	1	1	1	1	1		
4SD2[6]	-	Generate chemical data for sediment in surface drainage downgradient of Rubble Fill area to determine whether site contaminants are being transported offsite by this mechanism.	4SD2	2		2	2	2	2	2		2
		Subtotal Sediments		3		3	3	3	3	3	0	3
		Subtotal Surface Water			2	2	2	2	2	2	0	0
		Total Soils		17		17	17	17	17	17	2	5
		Total Water[6]			12	12	12	12	12	12	0	2

TABLE 7-9 (continued)
RUBBLE FILL AT BUNKER A-86 FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth	Rationale	Sample Designations	Sample Type		Analysis[1]						
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	Engineering[4]
PROPOSED 8 Test borings (including 5 well borings) 5 Wells												

Notes:

(1) Rinsate blanks are to be analyzed for all analytical parameters for which analyses are shown.

(2) TAL metals plus Boron. Groundwater samples are to be analyzed for both total and dissolved TAL metals and Boron. Surface waters are to be analyzed for dissolved TAL metals and Boron only.

(3) Except for one sample obtained from the Spent Acid Storage and Disposal Area; and two samples from the Lower Subase; all TCLP analyses indicated are for TCLP-extract metals only.

(4) Engineering characteristics for soils and sediments include grain size distribution, moisture content, specific gravity, organic content, Cation Exchange Capacity, pH, and total organic carbon content; and for groundwater and surface water engineering characteristics include biochemical oxygen demand (5 day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia, and phosphorus (total).

(5) If a bedrock well is required, it will be installed into the first significant water bearing unit and to a minimum depth of 20 feet or whichever is greater.

(6) Total includes two sampling rounds.

(7) All surface waters shall also be analyzed by the laboratory for hardness, temperature and pH.

TABLE 7-10
TORPEDO SHOPS
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations and other geological features.	Use existing site survey maps and draft site maps using AutoCAD®. Survey sample locations and elevation.
Geologic Investigation	Further define bedrock surface. Locate geologic contact and identify formation. /Geologic contact has not been accurately located, and depth to bedrock information is not complete around the buildings.	View stereo pairs of the site to map lineaments. Survey bedrock outcrops and measure strike and dip of bedrock fractures. Place a boring at the probable location of bedrock geologic formation contact and obtain core samples at locations 7TB7 and 7MW3D.
Hydrogeologic Investigation	Determine selection of screen settings in both shallow and deep wells. /Stratigraphy has not been fully characterized in the areas surrounding the buildings at the site.	Determine stratigraphy from test borings.
	Further identify and characterize hydrogeologic units. /Hydrogeologic information has not been collected from areas around the perimeter of the site or around the present buildings.	Place monitoring wells and borings at site perimeter and near probable source areas.
	Further define direction and gradients of ground water flow and determine hydraulic conductivity. /Precise ground water flow direction has not been determined for the entire site. Hydraulic conductivity has not been fully characterized at the site.	Measure water levels from new and existing wells and perform single well hydraulic conductivity tests (7MW7S, 7MW7D). Collect data to prepare a base-wide ground water elevation map.
Chemical Investigation Soils	Determine source of VOC and antimony contamination and further evaluate the nature and extent of contamination; health risk data. /Exact source of previously detected VOC and antimony contamination has not been determined.	Perform a soil gas survey around Torpedo Shops Buildings and in areas of former storage tanks and drum storage. Based upon the results of this survey and a knowledge of existing and historical chemical handling procedures, install test borings. Samples to be selected for laboratory analysis will be based upon field screening tests. If contamination is detected based upon field screening, additional borings will be installed as necessary to determine extent of soil contamination. Plot or contour concentrations of chemicals of concern on site maps.
	Determine extent and degree of soil contamination from waste Otto fuel tank and associated plumbing; health risk data. /Extent and degree of contamination due to waste Otto fuel tank has not been determined.	
	Determine extent and degree of soil contamination from former underground storage tank; health risk data. /No previous data has been collected regarding former underground storage tank.	
Ground Water	Further evaluate the nature and extent of ground water contamination; collect additional risk assessment data. /Contaminant plume has not been fully characterized.	Install monitoring wells in aquifers of concern; design monitoring well network to determine the extent of the plume; wells will also be located in downgradient area to confirm that the leading edge of the plume is located; collect and analyze samples.

TABLE 7-10 (Continued)
TORPEDO SHOPS
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
	Identify upgradient water quality for each geologic unit. /Shallow upgradient water quality information was not characterized previously.	Install upgradient monitoring wells in aquifers of concern and collect and analyze samples.
	Determine source of ground water contamination. /Contaminant sources were not determined with regard to ground water contamination.	Collect and analyze ground water samples and compare results to expected waste characteristics and background levels.
	Determine whether seasonal fluctuations occur in contaminant concentrations in the ground water and in hydraulic characteristics. /Seasonal fluctuation of contaminants has not been previously investigated.	Sample and analyze ground water; two rounds of sampling.
Surface Water and Sediment	Further define surface water and sediment chemical quality. /Data regarding surface water and sediments chemical quality at the site is limited.	Collect and compare up- and downgradient sediment samples. Sample surface water during a storm event.
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study evaluation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil and ground water samples for specified engineering characteristic parameters.

TABLE 7-11
TORPEDO SHOPS
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Detected in ground water and soils during Step I. Constituents of onsite chemicals/materials and potentially present in petroleum products.
SVOC[2]	●	Detected in soils during Step I and potentially present in petroleum products.
Inorganics[3]	●	Detected in soils during Step I and potentially present in petroleum products.
Pesticides	●	Detected in soils during Step I but not ground water. Not included in proposed ground water analysis.
PCB[4]	●	Detected in soils during Step I but not ground water. Not included in proposed ground water analysis.
TCLP[5]	●	Determine hazardous waste characteristics for selected samples.
Radiological Analyses[6]		Radiological contamination not suspected.
Dioxins[7]		Historically, neither petroleum products nor chlorinated solvent have been burned at this site and dibenzofuran was not detected during the Step I investigation.
Engineering Characteristics[8]	●	Feasibility study data requirements for select samples.
TPH[9]	●	Useful in assessing petroleum contamination.

Notes:

1. VOC means volatile organic compound listed in the CLP TCL.
2. SVOC means semi-volatile organic compound listed in the CLP TCL.
3. Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.
4. PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.
5. TCLP means toxicity characteristic leaching procedures.
6. Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.
7. Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.
8. Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).
9. TPH means total petroleum hydrocarbons.

TABLE 7-12
TORPEDO SHOPS FIELD SAMPLING PLAN

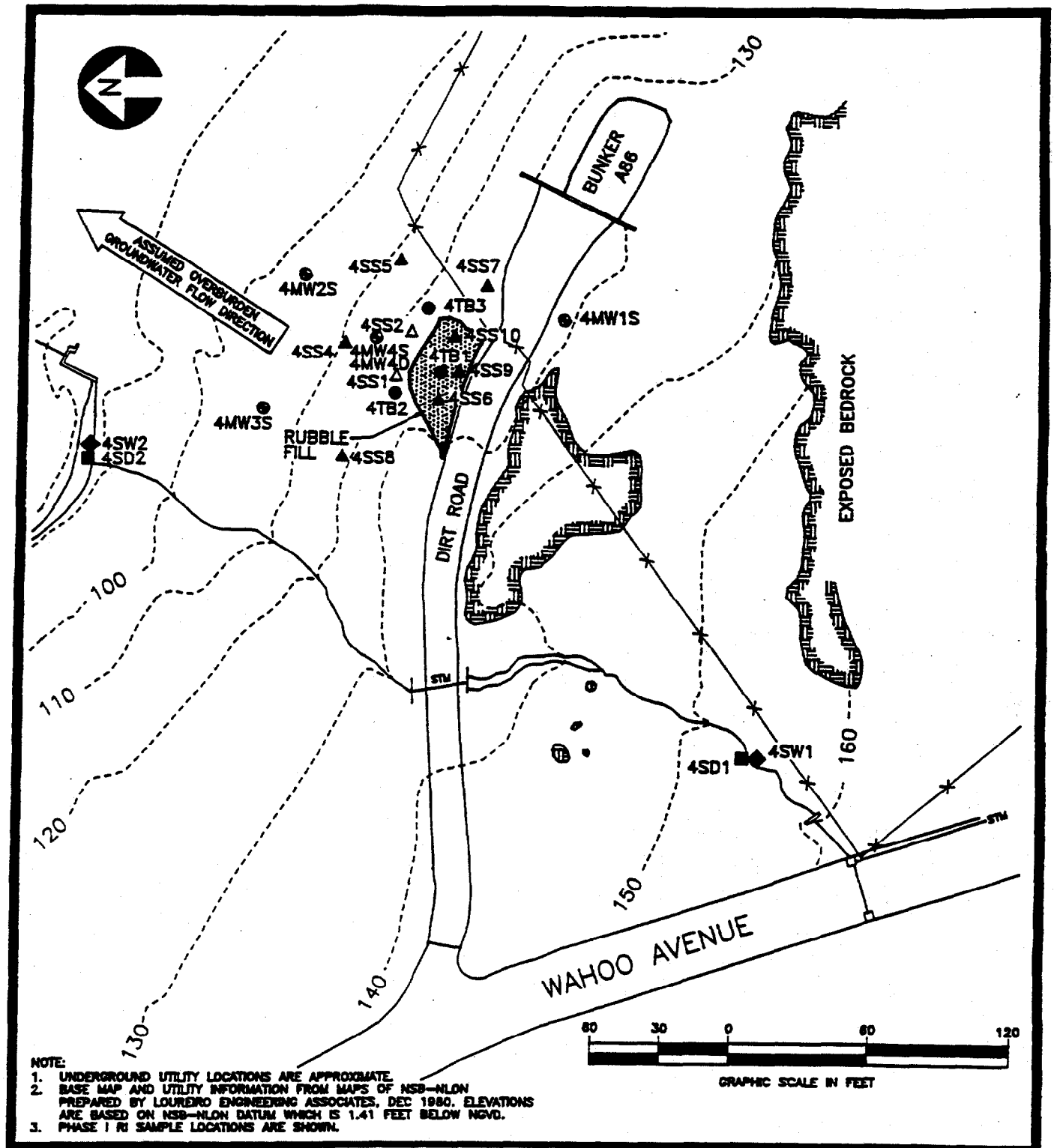
Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type (No. of Samples)		Analysis[1]							
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	TPH	Engineering[4]
Monitoring Wells													
7MW1D	Bedrock/25'	Existing	7GW1D		1	1	1	1					
7MW2S	Overburden/15±'	Existing	7GW2S		1	1	1	1					
7MW2D	Bedrock/20' (minimum penetration of bedrock)	Monitor quality of deep (bedrock) aquifer downgradient of north system leach field.	7GW2D		1	1	1	1					1
7MW3S	Overburden/15±'	Existing	7GW3S		1	1	1	1					
7MW3D	Bedrock/20' (minimum penetration of bedrock)	Monitor quality of deep (bedrock) aquifer downgradient of south system leaching field.	7GW3D		1	1	1	1					1
7MW4S	Overburden/25±'	Monitor quality of shallow ground water in area of paint shop and test for soil contamination upgradient of Building 325.	7GW4S		1	1	1	1					
			7MW4S (depth)	1		1	1	1	1	1			1
7MW5S	Overburden/25±'	Provide chemical data for shallow ground water and soils downgradient and near the former underground Otto fuel tank.	7GW5S		1	1	1	1					1
			7MW5S (depth)	1		1	1	1	1	1			1
7MW5D	Bedrock/20' (minimum penetration of bedrock)	Monitor quality of deep ground water in area of former Otto fuel tank.	7GW5D		1	1	1	1					1
7MW6S	Overburden/25±'	Provide chemical data for shallow ground water in and soils near and downgradient of Building 325.	7GW6S		1	1	1	1					
			7MW6S (depth)	1		1	1	1	1	1			
7MW7S	Overburden/25±'	Provide chemical data for shallow ground water in between both buildings and provide essential hydrogeologic data in center of site.	7GW7S		1	1	1	1					
			7MW7S (depth)	1		1	1	1	1	1			1
7MW8S	Overburden/25±'	In former tank grave.	7GW8S[5]		1	1	1	1				1[5]	
			7MW8S (water table)[5]	1		1	1	1	1	1	1	1[5]	1
7MW9S	Overburden/25±'	Downgradient of former tank.	7GW9S		1	1	1	1				1	
			7MW9S (water table)	1		1	1	1				1	
7MW10S	Overburden/25±'	Downgradient of former tank.	7GW10S		1	1	1	1				1	
			7MW10S (water table)	1		1	1	1				1	
Test Borings													
7TB7	NA/Bedrock (25±')	Determine stratigraphy and nature of fill. Provide chemical characteristics of soils upgradient of north system. At location of bedrock formation contact.	7TB7 (depth)	1		1	1	1	1	1			
7TB8	NA/Bedrock (25±')	Determine stratigraphy and nature of fill in "back door" area of site.	7TB8 (depth)	1		1	1	1	1	1			

TABLE 7-12 (continued)
TORPEDO SHOPS FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type (No. of Samples)		Analysis[1]								
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	TPH	Engineering[4]
7TB9	NA/Bedrock (25±')	Determine stratigraphy and nature of fill in former drum storage area. Provide chemical data to determine if possible chemical release occurred in area.	7TB9 (depth)	1		1	1	1	1	1			
7TB10	NA/Bedrock (25±')	Determine stratigraphy and nature of fill south of Building 325. Chemically characterize soils.	7TB10 (depth)	1		1	1	1	1	1			
7TB11-7TB13	NA/Bedrock (25±')	Determine stratigraphy and nature of fill in area of abandoned underground Otto fuel tank. Evaluate extent of soil contamination.	7TB11 (depth)-7TB13 (depth)	3		3	3	3	3	3		3	3
7TB14	NA/Bedrock (25±')	Downgradient of former tank.	7TB14 (water table)	1		1	1	1				1	
7TB15	NA/Bedrock (25±')	Downgradient of former tank.	7TB15 (water table)	1		1	1	1				1	
7TB16	NA/Bedrock (25±')	At sample point SG21 with high soil gas measurement.	7TB16 (depth)	1		1	1	1	1	1			
7TB17-7TB21	NA/Bedrock (25±')	Optional borings to be installed to determine the extent of soil contamination, if detected, based upon the field screening results.	7TB17 (depth) - 7TB21 (depth)	5		5	5	5				5	5
		Subtotal Soil		22		22	22	22	13	13	1	13	12
		Subtotal Water[6]			13	13	13	13	0	0	0	3	4
Sediment and Surface Water Sampling													
7SD2 7SD3 7SW1	NA	Provide chemical data for sediments both in up- and downgradient locations. Surface water sample is upgradient of Area A Downstream and downgradient of this site.	7SD2 and 7SD3	2		2	2	2	2	2			2
			7SW1[8]		1	1	1	1	1	1			
		Subtotal Soils		2		2	2	2	2	2	0	0	2
		Subtotal Surface Water			1	1	1	1	1	1	0	0	0
		Total Soils		**24**		**24**	**24**	**24**	**15**	**15**	**1**	**13**	**12**
		Total Water[7]			**27**	**27**	**27**	**27**	**1**	**1**	**0**	**6**	**8**

TABLE 7-12 (continued)
TORPEDO SHOPS FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type (No. of Samples)		Analysis[1]							
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	TPH	Engineering[4]
PROPOSED 20 Primary test borings (including 10 well borings) 5 Supplemental test borings 10 Wells - 3 Bedrock - 7 Overburden		Notes: (1) Rinsate Blanks are to be analyzed for all analytical parameters for which analyses are shown. (2) TAL metals plus Boron. Groundwater samples are to be analyzed for both total and dissolved TAL metals and Boron. Surface waters are to be analyzed for dissolved TAL metals and Boron only. (3) Except for one sample obtained from the Spent Acid Storage and Disposal Area; and two samples from the Lower Subase; all TCLP analyses indicated are for TCLP-extract metals only. (4) Engineering characteristics for soils/sediments include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon; groundwater and surface waters engineering characteristics include biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia, and phosphorus (total). (5) Sample also to be analyzed for oil type by fluorescence analysis. (6) One round of sampling. (7) Total includes two monitoring well sampling rounds. (8) All surface waters shall also be analyzed by the laboratory for hardness, temperature, and pH.											



NOTE:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON PREPARED BY LOUREIRO ENGINEERING ASSOCIATES, DEC 1980. ELEVATIONS ARE BASED ON NSB–NLON DATUM WHICH IS 1.41 FEET BELOW NGVD.
3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE – NEW LONDON
GROTON, CT

LEGEND

EXIST.	PROP.	
⊕ 4MW1	⊕ 7MW5	MONITORING WELL
○ 4TB1	● 7TB6	TEST BORING
□ 4SD1	■ 7SD6	SEDIMENT SAMPLE
△ 4SS1	▲ 7SS5	SURFACE SOIL SAMPLE
◇ 4SW1	◆ 7SW5	SURFACE WATER SAMPLE

---10---	EXIST CONTOUR
123	BUILDING No.
═══	WATERCOURSE
—STM—	STORM SEWER
□	CATCH BASIN

FIGURE 7–3
FIELD SAMPLING PLAN
RUBBLE FILL AT BUNKER A86

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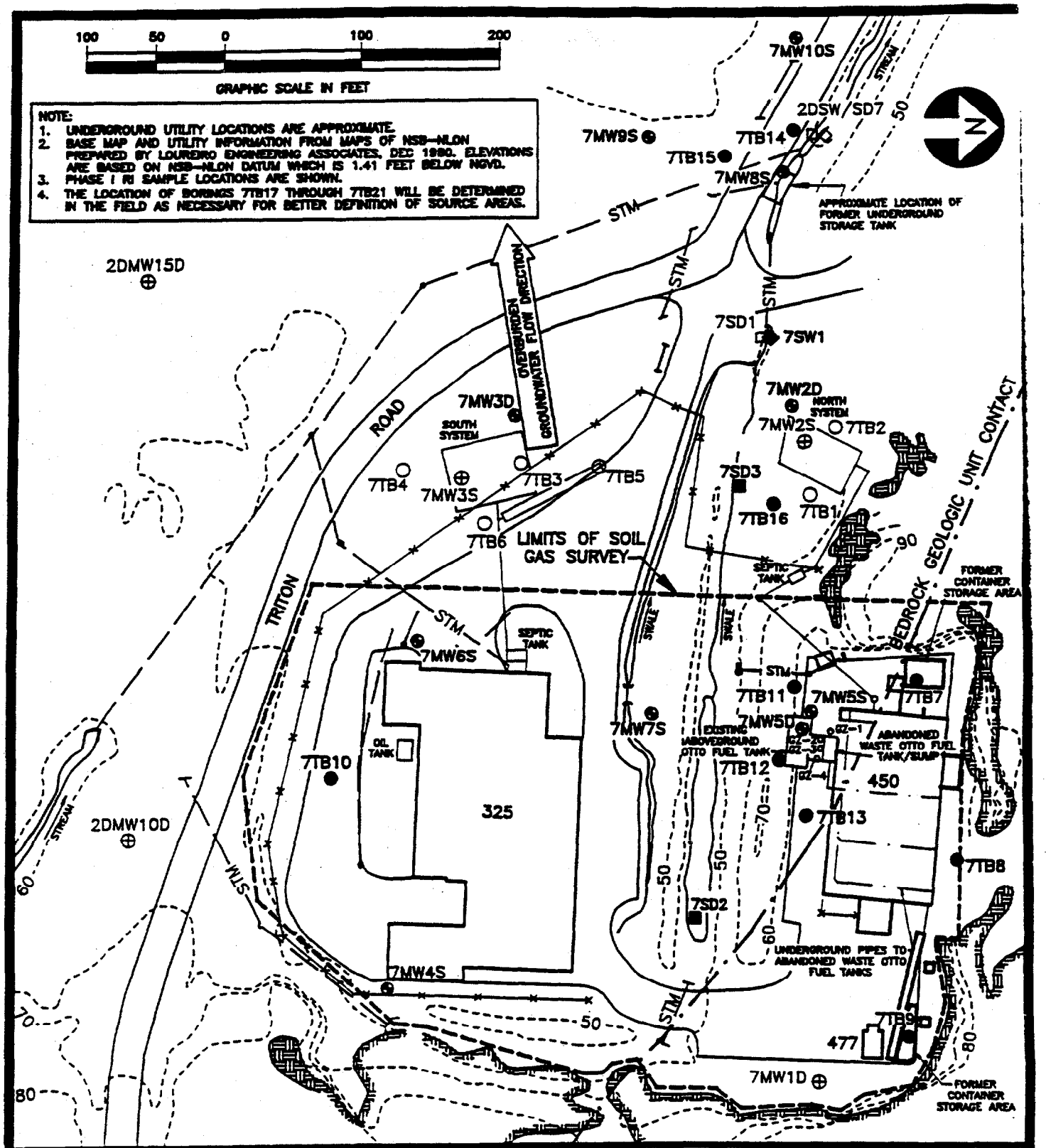

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CT

LEGEND

EXIST.	PROP.	
6MW1	7MW5	MONITORING WELL
6TB1	7TB5	TEST BORING
2DSD1	2DSD5	SEDIMENT SAMPLE
6SS1	7SS5	SURFACE SOIL SAMPLE
2DSW1	2DSW5	SURFACE WATER SAMPLE
GZ-1		WELL BY OTHERS

10	EXIST CONTOUR
123	BUILDING No.
	WATERCOURSE
STM	STORM SEWER
	CATCH BASIN

FIGURE 7-4
FIELD SAMPLING PLAN
TORPEDO SHOPS

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The general approach to be used in this investigation is described below. Actual placement of wells and borings relies on first performing soil gas and geologic surveys to identify potential areas of contamination and potential preferential ground water flow in the bedrock. Boring and/or well locations will be relocated to any locations where the soil gas survey identifies any area of moderate to high contamination and where potential preferential flow zones are identified in the bedrock. It is assumed that source areas of contamination will contain VOCs based on the detection of these substances in ground water during the Phase I RI. The focus of this investigation is principally around the Torpedo Shops, which are upgradient of the area evaluated during the Step I investigation (former subsurface sewage disposal systems). The field investigation is also based on previous chemical management activities at this site. Test borings will be drilled and soil samples collected for analysis near known and potential contaminant sources such as the abandoned waste Otto fuel tank, the former underground storage tank near the guard house, and areas where chemicals have been stored. Field screening techniques will be used to aid in selection of samples to be analyzed and in determining whether or not to install additional borings to better resolve the extent of contamination. A series of overburden and bedrock wells will be used to assess ground water quality and further evaluate site ground water hydrology.

7.2.3 Goss Cove

The site investigation's specific goals include the overall goals listed in Section 7.0 and the following:

- Further define the extent of lead, VOCs and SVOCs, pesticides and PCBs contamination in soil and ground water.
- Determine if dioxin exists in subsurface soils.
- Measure indoor air quality for risk assessment.
- Measure methane in soil gas and during installation of wells 6MW6S and 6D to determine if methane gas is present above levels of concern.
- Collect additional human health risk and ecological risk assessment data.
- Further define site geology and hydrology.
- Confirm that radiological constituents in ground water are from natural sources.

The remedial action objectives and associated investigative actions are included in Table 7-13. The rationale for selection of constituents for analysis is provided in Table 7-14. Table 7-15 provides details of the field sampling plan including location, number and type of samples; location rationale; and analysis requirements.

TABLE 7-13
GOSS COVE LANDFILL
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations and other geologic features. Measure strike and dip of bedrock fractures on exposed bedrock outcrop. /Information regarding bedrock fractures has not been extensively studied.	Use existing site survey maps to draft site maps using AutoCAD®. Survey sample locations and elevation.
Geologic Investigation	Better define stratigraphy below the landfill material and determine depths to bedrock. /Depth to bedrock has not been adequately determined.	Install select borings and monitoring wells to bedrock. Core 5 feet into bedrock at location 8TB9 and 8MW8D.
Hydrogeologic Investigation	Determine hydraulic conductivity of the different units below the site. /Hydraulic conductivity has not been determined for the deep bedrock aquifer.	Install nested monitoring wells to identify the vertical head differences between the units. Also perform a single well hydraulic conductivity test on one nested well (8MW2S,8MW2D).
	Determine if there is temporal fluctuation of ground water elevations. /Temporal fluctuation of ground water elevations has not been previously investigated at the site.	Measure ground water elevations prior to each round of sampling at low tide.
	Better define ground water flow directions. /The southern portion of site previously not investigated.	Evaluate ground water flow direction based on each round of water levels collected. Collect data to prepare a base-wide ground water elevation map.
Chemical Investigation Soils	Assess the potential for dioxins at the site. /Not previously analyzed for.	Sample soils in areas where dibenzofurans have previously been detected, especially ash samples.
	Further determine the nature, extent and degree of soil contamination within the Landfill; collect additional health risk assessment data. /Extent and degree of soil contamination not completely characterized previously.	Collect and analyze soil samples from proposed borings. Plot or contour concentrations of chemicals of concern on site maps.
Surface Water and Sediments	Determine presence or absence of chemical contamination of surface water and sediments in Goss Cove; for use in ecological and health risk assessment. /Cove sediments and surface water has not been previously analyzed.	Perform sediment sampling and surface water sampling in Goss Cove.
Air	Assess potential migration of VOCs to interior of Nautilus Memorial; health risk data. /Indoor air sampling not previously analyzed.	Collect air samples from the basement (boiler room) and the museum area (ground floor), as well as a background air sample from outside the building.
Ground Water	Determine the source of radiological constituents (natural or anthropogenic) detected in ground water. /Source of elevated radiological constituents in ground water has not been independently verified.	Perform radiological analysis (gross alpha/beta and gamma spectrum analysis) of ground water from wells with previous elevated levels of alpha and beta radiation (8MW1S, 8MW4S).

TABLE 7-13 (Continued)
GOSS COVE LANDFILL
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
	Evaluate potential temporal changes in ground water quality; collect additional health and ecological risk assessment data. /Temporal changes in ground water quality not previously addressed.	Perform two rounds of ground water sampling.
	Determine if a downward migration of contamination has occurred at the site. /Deep ground water not previously sampled at the site.	Analyze ground water from both deep and shallow wells at the site.
	Determine upgradient ground water quality. /Deep ground water quality not adequately characterized upgradient of the site.	Sample and analyze ground water from upgradient monitoring wells (8MW8S, 8MW8D).
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study elevation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil and ground water samples for specified engineering characteristic parameters.

TABLE 7-14
GOSS COVE LANDFILL
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Detected in subsurface soil and water samples collected during Step I.
SVOC[2]	●	Detected in subsurface soil samples collected during Step I.
Inorganics[3]	●	Detected in subsurface soil samples collected during Step I.
Pesticides	●	Detected in subsurface soil samples collected during Step I, but not ground water. Not included in proposed ground water analysis.
PCB[4]	●	Detected in subsurface soil and water samples collected during Step I, but not ground water. Not included in proposed ground water analysis.
TCLP[5]	●	Determine hazardous waste characteristics for selected samples.
Radiological Analyses[6]	●	Detected in ground water collected during Step I above screening values.
Dioxins[7]	●	Determine the possible presence of dioxins in areas previously identified as having dibenzofuran contamination.
Engineering Characteristics[8]	●	Feasibility study data requirements for select samples.

Notes:

1 VOC means volatile organic compound listed in the CLP TCL.

2 SVOC means semi-volatile organic compound listed in the CLP TCL.

3 Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.

4 PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.

5 TCLP means toxicity characteristic leaching procedures.

6 Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.

7 Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.

8 Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).

TABLE 7-15
GOSS COVE LANDFILL FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil	Water	Air	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	RAD[4]	Dioxin	Engineering[5]
Monitoring Wells															
8MW1	Existing	Existing	8GW1		1		1	1	1				1		
8MW2S	Existing	Existing	8GW2S		1		1	1	1						
8MW2D	Overburden/100±'	Located adjacent to area of high soil gas concentrations. Evaluates water quality at interval above bedrock surface; health and ecological risk data.	8MW2D (0-1)	1			1	1	1	1	1	1			1
			8MW2D (depth)	1			1	1	1	1	1				1
			8GW2D		1		1	1	1						
8MW3	Existing	Existing	8GW3		1		1	1	1						
8MW4	Existing	Existing	8GW4		1		1	1	1				1		
8MW5S	Overburden/15±'	Previous investigation indicates highest inorganic concentrations in soil at the site are at 8TB1; 8MW5 will provide additional soil data. Also provides additional hydrogeologic and ground water quality information; health and ecological risk data.	8GW5S		1		1	1	1						
			8MW5S (depth)	1			1	1	1	1	1	1			1
8MW6S	Overburden/15±'	Provide chemical data for soils and ground water directly adjacent to the Nautilus Museum Building; health risk and ecological risk data.	8MW6S (0-1)	1			1	1	1	1	1				
8MW6D	Overburden/100±'		8GW6S		1		1	1	1						
			8MW6S (depth)	1			1	1	1	1	1	1			1
			8MW6D (depth)	1			1	1	1	1	1				1
			8GW6D		1		1	1	1						
8MW7S	Overburden/15±'	Provide chemical data for soils and ground water in an area adjacent to moderate soil gas concentrations. Also provide additional hydrogeologic and water quality information near Goss Cove; health and ecological risk data.	8MW7S (0-1)	1			1	1	1	1	1				
			8GW7S		1		1	1	1						
			8MW7S (depth)	1			1	1	1	1	1	1			1
8MW8S	Overburden/top of bedrock (30±')	Upgradient background well to provide background water quality values for the site.	8GW8S		1		1	1	1						1
			8MW8S (depth)	1			1	1	1	1	1				1
8MW8D[6]	Bedrock/50±'	Upgradient background well to provide background water quality values for the site.	8MW8D (depth)	1			1	1	1	1	1				1
			8GW8D		1		1	1	1						

TABLE 7-15 (continued)
GOSS COVE FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil	Water	Air	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	RAD[4]	Dioxin	Engineering[5]
Test Borings															
8TB4	NA/Base of fill (20±')	Provide chemical characteristics of soils located in an area of moderate soil gas concentrations. Also provide stratigraphy and depth to bedrock information.	8TB4 (0-1)	1			1	1	1	1	1				
			8TB4 (depth)	1			1	1	1	1	1	1			
8TB5	NA/Base of fill (20±')	Near area of elevated PAH and area of moderate soil gas concentrations.	8TB5 (depth)	1			1	1	1	1	1	1		1	
8TB6	NA/Base of fill (20±')	Near area of elevated PAHs found in 8TB2 and 8TB3 soils.	8TB6 (0-1)	1			1	1	1	1	1				
			8TB6 (depth)	1			1	1	1	1	1	1		1	
8TB7	NA/Base of fill (20±')	Provide data regarding the extent of landfill material; chemical characteristics.	8TB7 (depth)	1			1	1	1	1	1				
8TB8	NA/Base of fill (20±')	Provide chemical data in area of high soil gas concentrations.	8TB8 (0-1)	1			1	1	1	1	1				
			8TB8 (depth)	1			1	1	1	1	1	1			
8TB9	NA/Base of fill (20±')	Provide data regarding the extent of landfill material; chemical characteristics.	8TB9 (depth)	1			1	1	1	1	1	1			
8TB10	NA/Base of fill (20±')	Provide data regarding the extent of landfill material; chemical characteristics.	8TB10 (depth)	1			1	1	1	1	1				
8TB11-15	NA/Base of fill (20±')	Optional borings to be installed to determine extent of soil contamination, if required, based upon the field screening results.	8TB11-15 (depth)	5			5	5	5	5	5				
			Subtotal Soil	25	0		25	25	25	25	25	9	0	2	8
			Subtotal Ground Water[7]	0	11		11	11	11	0	0	0	2	0	1
Surface Water/Sediment Sampling															
8SW2	Surface water	Provide chemical data for surface water and sediments in Goss Cove; near shore of landfill.	8SW2[9]		1		1	1	1	1	1				1
8SD2	Sediment		8SD2	1			1	1	1	1	1				1
8SW3	Surface water	Provide additional data for the surface water and sediments in Goss Cove; near shore of landfill.	8SW3[9]		1		1	1	1	1	1				1
8SD3	Sediment		8SD3	1			1	1	1	1	1	1			1

TABLE 7-15 (continued)
GOSS COVE FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil	Water	Air	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP[3]	RAD[4]	Dioxin	Engi-neering[5]
8SW4	Surface water	Provide chemical data for surface water and sediments in Goss Cove area near shore of landfill.	8SW4[9]		1		1	1	1	1	1				1
8SD4	Sediment		8SD4	1			1	1	1	1	1				1
8SW5	Surface water	Provide chemical data for surface water and sediments in Goss Cove away from the immediate influence of landfill material.	8SW5[9]		1		1	1	1	1	1				1
8SD5	Sediment		8SD5	1			1	1	1	1	1				1
8SW6	Surface water	Provide chemical data for surface water and sediments in Goss Cove away from the immediate influence of landfill material.	8SW6[9]		1		1	1	1	1	1				1
8SD6	Sediment		8SD6	1			1	1	1	1	1				1
			Subtotal Sediments	5	0	0	5	5	5	5	5	1	0	0	5
			Subtotal Surface Water	0	5	0	5	5	5	5	5	0	0	0	5
Air Sampling															
8AS1	Air/Tenax tube	Located in basement of building in the boiler room where contaminants are likely to enter the building through foundation walls.	8AS1			1	1								
8AS2	Air/Tenax tube	Located in main exhibition room where workers and visitors are likely to be exposed for the longest duration.	8AS2			1	1								
8AS3	Air/Tenax tube	Outside building to represent background conditions at the site.	8AS3			1	1								
			Subtotal Air/Round	0	0	3	3	0	0	0	0	0	0	0	0
			Total Soils	**30**	**0**	**0**	**30**	**30**	**30**	**30**	**30**	**10**	**0**	**2**	**13**
			Total Water[8]		**27**		**27**	**27**	**27**	**5**	**5**	**0**	**2**	**0**	**7**
			Total Air[8]			**6**	**6**								

TABLE 7-15 (continued)
GOSS COVE FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil	Water	Air	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP[3]	RAD[4]	Dioxin	Engi-neering[5]
PROPOSED 14 Primary test borings (including well borings) 5 Supplemental test borings 7 Wells - 1 Bedrock - 4 Shallow overburden - 2 Deep overburden															

Notes:

(1) Rinsate blanks are to be analyzed for all parameters for which analyses are shown.

(2) TAL metals plus Boron. Groundwater samples are to be analyzed for both total and dissolved TAL metals and Boron. Surface waters are to be analyzed for dissolved TAL metals and Boron only.

(3) Except for one sample obtained from the Spent Acid Storage and Disposal Area; and two samples from the Lower Subase; all TCLP analyses indicated are for TCLP-extract metals only.

(4) RAD means gamma spectrum analysis and gross alpha/beta analysis one round only.

(5) Engineering characteristics for soils/sediments include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon; groundwaters and surface water engineering characteristics include biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia, and phosphorus (total).

(6) Bedrock well will be installed into first significant water bearing unit and to a minimum depth of 20 feet.

(7) One round of ground water sampling.

(8) Total includes two rounds of sampling.

(9) Surface waters shall also be analyzed by the laboratory for hardness, temperature, and pH.

Figure 7-5 illustrates the proposed sample locations.

A general overview of this investigation is described below. The wells and borings are located to define further the nature and extent of contamination detected during the Step I investigation; locations are approximate as utility conflicts may warrant slight relocation. Subsurface soils may contain any or all of the following: VOCs, SVOCs, inorganics, pesticides and PCBs, based on the detection of these substances in soils and ground water during the Step I investigation. Field screening techniques will be used to aid in the decision to install additional supplemental resolution borings if required. Soil samples will be collected at discrete intervals based on visual and field screening observations. Samples for engineering analysis will be selected to be from the screened interval of a monitoring well or in areas that may require remediation. Near surface (0-1') samples will also be collected for the risk assessment. The collected soil, ground water, and indoor air sampling at the museum will allow a quantitative health risk assessment to be performed at this site. In addition to human health risks, ecological risk assessment of Goss Cove and the Thames River will be conducted. Surface water and sediment sampling of Goss Cove is included. Thames River investigations are discussed in detail in Section 5.0 of this Work Plan. Sample locations specified in Section 5.0 include a transect of sediment samples (T3SD1, T4SD1, T5SD1) starting along the bank of the Thames River north and upstream of the pier, yet south and downstream of the storm drain outfall from the ball fields. These sample locations are shown in Figure 5-3 and described in Table 5-2. Proposed additional ground water investigation will provide water quality information to be used in the ecological risk assessment.

7.2.4 Spent Acid Storage and Disposal Area

The specific goals of this investigation include the overall goals listed in Section 7.0 and the following:

- Determine the nature and extent of lead, VOC and SVOC contamination in ground water.
- Determine if soils may be classified as hazardous on the basis of TCLP analysis.
- Collect human health risk assessment data.
- Further define site geology and hydrology.

The remedial action objectives and associated investigative actions are included in Table 7-16. The rationale for selection of constituents for analysis is provided in Table 7-17. Table 7-18 provides details of the field sampling plan including location, number and type of samples; location rationale; and analysis requirements.

Figure 7-6 illustrates the proposed sample locations.

TABLE 7-16
SPENT ACID STORAGE AND DISPOSAL AREA
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations and other geologic features.	Use existing site survey maps and draft site maps using AutoCAD®. Survey sample locations and elevations.
Geologic Investigation	Further characterize the stratigraphy of overburden and depth to bedrock. /Depth to bedrock has not been determined at this site.	Perform a series of test borings; collect continuous core samples; complete two test borings to bedrock. Core 5 feet into bedrock at 15MW2S.
Hydrogeologic Investigation	Determine appropriate screen interval for shallow well(s). /Accurate ground water elevation has not been determined at the site.	Determine stratigraphy/depth to ground water from test borings.
	Characterize hydrogeologic unit. /Ground water monitoring wells were not previously installed at the site.	Locate monitoring wells up- and downgradient of source area.
	Further define ground water direction and estimate gradient. /No ground water elevation or direction data exists for the site.	Perform ground water elevation measurements prior to each round of sampling. Collect data to prepare a base-wide ground water elevation map.
	Determine ground water flow rates. /Hydraulic conductivity tests have not been previously performed.	Perform hydraulic conductivity tests on wells 15MW1S and 15MW3S.
Chemical Investigation Soils	Confirm source of soil contamination, particularly lead. Determine nature, extent, and degree of subsurface soil contamination; collect additional risk assessment data. /Nature, extent, and degree of soil contamination not adequately characterized.	Install a series of test borings. Collect a soil sample from each boring for laboratory analysis. Samples will be selected on the basis of field screening tests (X-ray fluorescence for lead). Plot or contour concentrations of concern on site maps.
Ground Water	Determine nature, extent, and degree of ground water contamination; collect health risk assessment data. /Nature, extent, and degree of ground water contamination has not been previously investigated.	Install monitoring wells to determine extent of contaminant plume, if any. Sample all wells for constituents of concern.
	Identify upgradient ground water quality. /Ground water monitoring wells were not previously installed at the site.	Sample and analyze water sample from upgradient monitoring well.
	Evaluate potential temporal changes in ground water quality. /No ground water quality data exists for the site.	Perform two rounds of ground water sampling analysis.
Sediments	Evaluate contaminant concentrations in nearby stormwater drainage system sediments. Determine if contaminants are being transported offsite. /Offsite transport of contamination has not been previously investigated with respect to the storm water drainage system.	Sample and analyze sediment sample from stormwater manhole serving study area system.
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study evaluation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil and ground water samples for specified engineering characteristic parameters.

Note: Shaded areas will not be completed by Halliburton NUS.

TABLE 7-17
SPENT ACID STORAGE AND DISPOSAL AREA
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Detected in one soil sample during Step I. Study area not adequately characterized for this parameter.
SVOC[2]	●	Detected in one soil sample during Step I. Study area not adequately characterized for this parameter.
Inorganics[3]	●	Detected in one soil sample during Step I. Heavy metals (especially lead) are significant constituents of spent battery acid.
Pesticides	●	Study area not adequately characterized for this parameter during Step I.
PCB[4]	●	Study area not adequately characterized for this parameter during Step I.
TCLP[5]	●	Determine hazardous characteristics for selected samples. Four previous soil samples from study area failed TCLP for lead.
Dioxin[6]		Historically, neither petroleum products nor chlorinated compounds have been burned at this site and dibenzofuran was not detected during Step I investigations.
Engineering Characteristics[7]	●	Feasibility Study data requirements for select samples.

Notes:

1. VOC means volatile organic compound listed in the CLP TCL.
2. SVOC means semi-volatile organic compound listed in the CLP TCL.
3. Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.
4. PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.
5. TCLP means toxicity characteristic leaching procedures.
6. Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.
7. Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.
8. Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).

TABLE 7-18
SPENT ACID STORAGE AND DISPOSAL AREA FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]						
				Soil	Water	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP	Engi-neering[3]
Monitoring Wells												
15MW1S	Overburden/20±' (advance to bedrock)	Provide chemical data for shallow and deep ground water and subsurface soils in source area, immediately downgradient of the former acid storage tank; determine depth to bedrock.	15MW1S (depth)	1		1	1	1	1	1	1	1
			15GW1S		1	1	1	1	1	1		1
15MW1D	Bedrock/50'±		15GW1D		1	1	1	1	1	1		
15MW2S	Overburden/20±'	Monitor quality of shallow ground water and test for soil contamination upgradient of the former acid storage tank.	15MW2S (depth)	1		1	1	1	1	1		
			15GW2S		1	1	1	1	1	1		
15MW3S	Overburden/20±'	Monitor quality of shallow ground water and subsurface soils downgradient of the former acid storage tank.	15MW3S (depth)	1		1	1	1	1	1		
			15GW3S		1	1	1	1	1	1		
15MW4S	Overburden/20±' (advance to bedrock)	Monitor quality of shallow ground water and subsurface soils downgradient of the former acid storage tank; determine depth to bedrock.	15MW4S (depth)	1		1	1	1	1	1		
			15GW4S		1	1	1	1	1	1		
Test Borings												
15TB4	NA/15±'	Determine stratigraphy/nature of fill immediately north of the former acid storage tank. Further determine nature, extent and degree of soil contamination.	15TB4 (depth)	1		1	1	1	1	1	1	1
15TB5	NA/15±'	Further define extent of subsurface soil contamination (within 35' southeast of former acid tank).	15TB5 (depth)	1		1	1	1	1	1	1	
15TB6	NA/15±'	Further define extent of subsurface soil contamination (within 35' west of former acid tank).	15TB6 (depth)	1		1	1	1	1	1	1	
15TB7	NA/15±'	Further define extent of subsurface soil contamination (within 50' south of former acid tank).	15TB7 (depth)	1		1	1	1	1	1		
15TB8	NA/15±'	Further define extent of subsurface soil contamination (within 50' northwest of former acid tank).	15TB8 (depth)	1		1	1	1	1	1		
15TB9	NA/15±'	Determine nature and extent of subsurface soil contamination within 50' east of former acid tank.	15TB9 (depth)	1		1	1	1	1	1		
15TB10-15TB14	NA/15±'	Optional borings to be installed to determine extent of soil contamination, if required, based on the field screening results.	15TB10 (depth)-15TB14 (depth)	5		5	5	5	5	5		

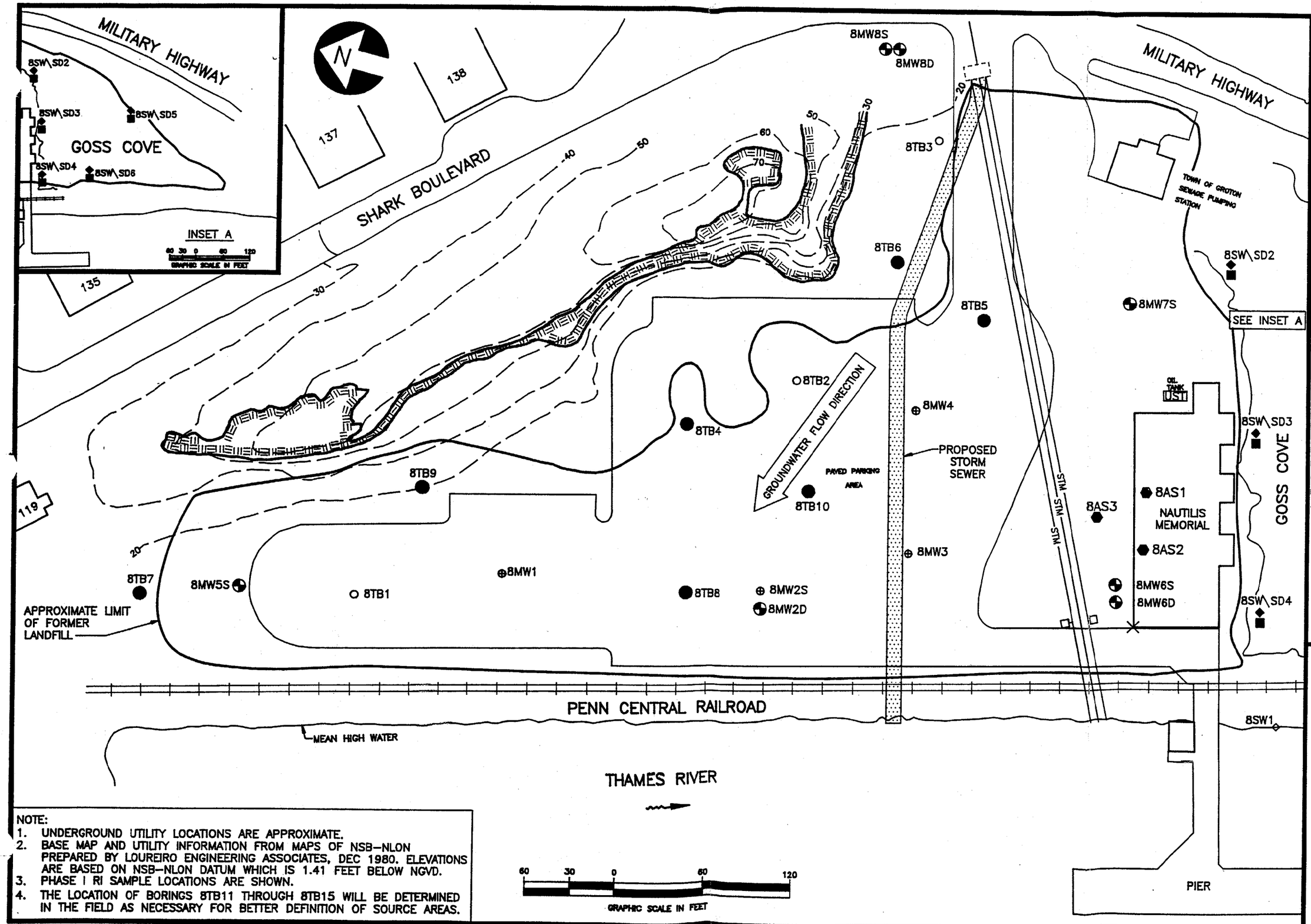
TABLE 7-18 (continued)
SPENT ACID STORAGE AND DISPOSAL AREA FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]						
				Soil	Water	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP	Engineering[3]
			Subtotal Soils	4	0	4	4	4	4	4	1[4]	1
			Subtotal Water[5]	0	5	5	5	5	5	5	0	1
Sediment Sampling												
15SD1	-	Provide chemical data for sediment from downgradient, stormwater location to determine whether site contaminants are being transported offsite by these mechanisms.	15SD1	1		1	1	1	1	1		1
			Subtotal Sediments	0	0	0	0	0	0	0	0	0
			Total Soils	4	0	4	4	4	4	4	1[1]	1
			Total Water[6]	0	10	10	10	10	10	10	0	2

PROPOSED
4 Wells

Notes:
(1) Rinsate blanks are to be analyzed for all parameters for which analyses are shown.
(2) TAL metals plus boron. Groundwater samples are to be analyzed for total and dissolved TAL metals plus boron. Surface waters are to be analyzed for dissolved TAL metals and Boron only.
(3) Engineering characteristics for soil/sediments are to include grain-sized distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon; groundwater and surface water engineering characteristics include biochemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia, and phosphate (total).
(4) Sample to be analyzed for full TCLP constituent list.
(5) Total includes one sampling round only.
(6) Total includes two rounds of sampling.

Shaded areas will not be completed by Halliburton NUS.



NOTE:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON PREPARED BY LOUREIRO ENGINEERING ASSOCIATES, DEC 1980. ELEVATIONS ARE BASED ON NSB–NLON DATUM WHICH IS 1.41 FEET BELOW NGVD.
3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.
4. THE LOCATION OF BORINGS 8TB11 THROUGH 8TB15 WILL BE DETERMINED IN THE FIELD AS NECESSARY FOR BETTER DEFINITION OF SOURCE AREAS.

FIGURE 7–5
FIELD SAMPLING PLAN
GOSS COVE LANDFILL

ATLANTIC ENVIRONMENTAL SERVICES, INC.

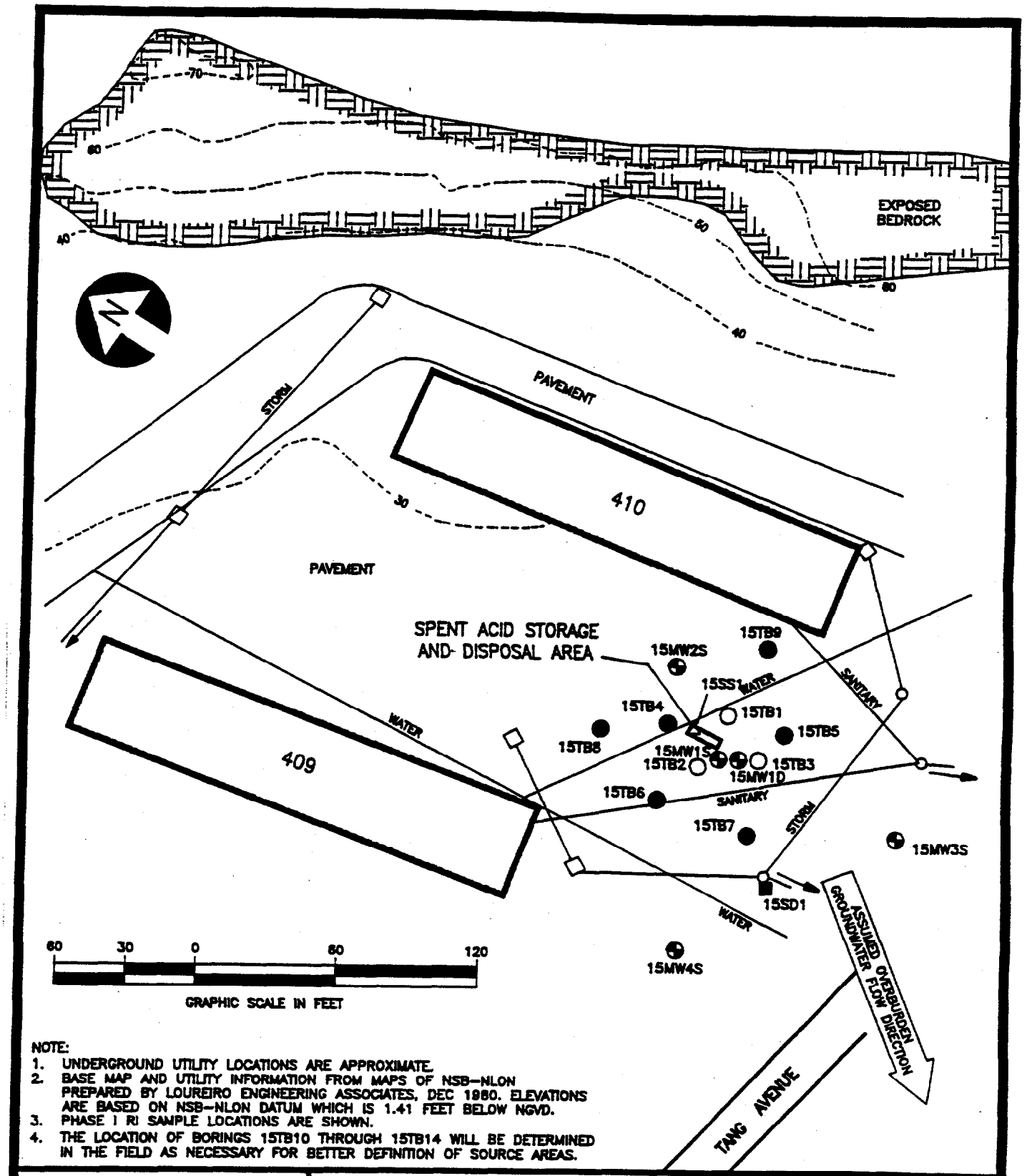
LEGEND

10	EXIST CONTOUR
123	BUILDING No.
	WATERCOURSE
STM	STORM SEWER
	CATCH BASIN

EXIST.	PROP.	
6MW1	7MW5	MONITORING WELL
6TB1	7TB5	TEST BORING
2DSD1	2DSD5	SEDIMENT SAMPLE
	8AS1	AIR SAMPLE
2DSW1	2DSW5	SURFACE WATER SAMPLE

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE–NEW LONDON
GROTON, CONN.

06271101Z



NOTE:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON PREPARED BY LOUREIRO ENGINEERING ASSOCIATES, DEC 1980. ELEVATIONS ARE BASED ON NSB–NLON DATUM WHICH IS 1.41 FEET BELOW NGVD.
3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.
4. THE LOCATION OF BORINGS 15TB10 THROUGH 15TB14 WILL BE DETERMINED IN THE FIELD AS NECESSARY FOR BETTER DEFINITION OF SOURCE AREAS.

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE – NEW LONDON
GROTON, CT

LEGEND

EXIST.	PROP.	
15MW1	15MW1	MONITORING WELL
15TB1	15TB1	TEST BORING
15SD1	15SD1	SEDIMENT SAMPLE
15SS1	15SS1	SURFACE SOIL SAMPLE
15SW1	15SW1	SURFACE WATER SAMPLE

---10--- EXIST CONTOUR
123 BUILDING No.
WATERCOURSE
MANHOLE
CATCH BASIN

FIGURE 7–6
FIELD SAMPLING PLAN
SPENT ACID STORAGE AND DISPOSAL AREA

ATLANTIC ENVIRONMENTAL SERVICES, INC.

The general approach to be used in this investigation is presented below. Preliminary investigations at this site identified low levels of VOCs and PAHs, and elevated levels of lead in subsurface soils in the vicinity of the former acid storage tank. The Step II investigation is designed to determine the presence of soil contamination in monitoring well borings associated with past spent acid management activities, and whether contamination has impacted local ground water. The field program will consist of the installation of monitoring wells, and the collection of soil (subsurface), and ground water samples for chemical analysis. The investigation will focus on the vicinity of the spent acid tank and downgradient to define the extent of groundwater contamination. A series of monitoring wells will be installed to assess site groundwater quality and evaluate site groundwater hydrology. The well borings will be sampled for geologic and chemical characterization of subsurface media and fill materials. Field screening of continuous split spoon samples using X-ray fluorescence methods will facilitate delineation of lead contamination and selection of appropriate soil samples for chemical analysis.

7.3 Supplemental Step II Investigations

7.3.1 Area A

The site investigation's specific goals of the investigation are summarized below; the goals address the recommendations of the Phase I RI report and Technical Review Committee comments. General investigation tasks are provided for each goal.

- Define extent of contamination near concrete pad (former chemical storage area) located at the west end of the Area A Landfill.
    - Subsurface soil analysis from test borings and boreholes which will be subsequently used for monitoring well installations will be conducted
- Confirm that elevated levels of pesticides are not present in the Area A Wetland.
    - sediment samples will be collected and analyzed
- Expand study area to include Weapons Center.
    - soil, ground water and sediment analysis will be conducted
- Further define extent of pesticide contamination in surface soil and sediment in Area A Downstream.
    - surface soil and sediment sampling and analysis will be conducted.
- Further assess ground water flow direction and hydraulic gradients, particularly at southeast end of landfill near NSB-NLON east gate.

- additional overburden and bedrock monitoring wells will be installed, samples analyzed and water levels measured monthly at select locations; ground water flow directions will be determined

- Define the extent of VOC and cadmium ground water contamination downgradient of the Area A Landfill.

  - additional overburden and bedrock monitoring wells will be installed and samples analyzed; ground water flow directions will be determined

- Further evaluate surface water quality (DDTR, metals, VOC) to determine if surface water remediation is appropriate and required.

  - a surface water sampling and analysis program will be undertaken

- Further evaluate potential ecological risks in Area A Downstream, primarily associated with elevated levels of pesticides.

  - the ecological assessment is discussed in Section 5.0

- Update human health risk assessment based on additional collected data.

  - the human health risk assessment is discussed in Section 4.0

- Evaluate the feasibility of pump-and-treat ground water remediation at the Area A Landfill.

  - a ground water pump test will be conducted in the Area A Landfill

- Determine if detectable concentrations of chlorinated dioxins exist in subsurface soils.

  - collect soil samples from locations where dibenzofurans were previously detected or from ash material

- Confirm that radiological constituents detected in ground water are from natural sources.

  - resample wells where radiological constituents previously exceeded action levels

- Define wetland boundaries within Area A.

  - perform wetlands delineation

The remedial investigation objectives and associated investigative actions are included in Table 7-19. The rationale for selection of constituents for analysis is provided in Table 7-20. Table 7-21 provides details of the field sampling plan including location, number and type of samples; location rationale; and analysis requirements.

Figures 7-7 and 7-8 illustrate the proposed sample locations.

7.3.2 DRMO

The specific goals of the investigation are summarized below; the goals address the recommendations of the Phase I RI report and Technical Review Committee comments. General investigation tasks are provided for each goal.

- Further define the extent of lead, VOCs, PAHs, PCBs and pesticides in onsite soils, particularly in the north end of the site.
  - Analyses of subsurface soils obtained from boreholes which will subsequently be used for the installation of monitoring wells, will be conducted
- Further evaluate ground water quality to confirm previous sampling round results and to assess potential impacts to Thames River.
  - install additional shallow and deep overburden wells, sample and analyze all existing and proposed wells
- Confirm that radiological constituents detected in ground water are from natural sources.
  - resample wells where radiological constituents previously exceeded action levels
- Update site geology and hydrology based on additional collected data.
  - to be based on additional test boring and monitoring well geology and hydrology data

TABLE 7-19
AREA A
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives	Action
	Area A	
Site Mapping	Map proposed sample locations and other geologic features.	Use existing site survey maps to draft site maps using AutoCAD®. Survey sample locations and elevations.
Geological Investigation	Identify possible pathways for ground water movement. /A fracture trace study has not been previously performed at the site.	Examination of aerial photographs for geologic structures (e.g., lineaments). Field measurements of geologic structures (e.g., joints, faults) at bedrock outcrops. Core 5 feet into bedrock at locations 2WMW21D, 2WMW22D, 2DMW24D, and 2DMW27D.
	Area A Landfill	
Hydrogeologic Investigation	Further assessment of the ground water flow direction between the southeast portion of Area A landfill and homes serviced by private wells near NSB-NLON East Gate. /The possibility of offsite migration to private wells located off base has not been fully investigated.	Install monitoring wells and measure water levels from select wells on a monthly basis for one year; residential wells as specified in Field Sampling Plan.
	Evaluate the feasibility of ground water extraction related to potential treatment. /An aquifer pump test has not been previously performed at the site.	Conduct aquifer pump tests; includes installing a pilot test well and piezometers, pumping the well at a constant rate, and measuring the changes in water level in piezometers located at different distances from the pilot well.
Chemical Investigation Ground Water	Obtain additional analytical data on ground water quality; collect additional health and ecological risk data. /Ground water quality at the southernmost portion of the site has not been evaluated.	Conduct two ground water sampling and analysis rounds from proposed and existing wells (second sampling round will be conducted three months after the first round).
	Determine the source of radiological constituents (natural or anthropogenic) detected in ground water. /Source of elevated radiological constituents in ground water has not been independently verified.	Collect ground water from monitoring wells in areas previously found to have gross alpha levels equal or greater than 5 pci/L and/or gross beta levels equal or greater than 50 pci/L, and perform specific radiological analysis (gamma spectrum, gross alpha/beta).
Subsurface Soil	Define lateral and vertical extent and degree of soil contamination identified around Area A concrete pad (former hazardous waste storage area); collect additional health risk data. /Lateral and vertical extent and degree of soil contamination associated with the concrete pad has not been determined.	Collect and analyze subsurface soil from proposed borings. Each soil sample will be field screened for volatile organic compounds and PCBs. Selected samples will be collected for laboratory analysis.
	Determine if detectable concentrations of chlorinated dioxins exist in subsurface soils; collect additional health and ecological risk data. /Dioxin analysis was not previously performed at the site.	Collect and analyze subsurface soil collected from areas where dibenzofurans and/or ash have been detected.
Engineering Investigation Ground Water	Determine levels of conventional pollutants in ground water. /Levels of conventional pollutants have not been determined previously at the site.	Analyze samples collected during pumping of the overburden aquifer.
Subsurface Soil	Determine engineering characteristics of soils from underlying geologic units. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze representative samples for engineering parameters.

TABLE 7-19 (continued)
AREA A
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives	Action
	Area A Wetlands	
Hydrogeologic Investigation	Further define ground water flow directions and calculate hydraulic gradients; determine whether seasonal or temporal fluctuations occur in ground water flow directions. /The possibility of offsite migration to private wells located off base has not been fully investigated.	Install monitoring wells and measure water levels from select proposed and existing wells on a monthly basis for one year; residential wells as specified in Field Sampling Plan.
Chemical Investigation Ground Water	Obtain additional analytical data on ground water quality; collect additional health and ecological risk data.	Conduct two ground water sampling and analysis rounds from existing and proposed wells (second sampling round will be conducted three months after the first round).
	Determine the source of radiological constituents (natural or anthropogenic) detected in ground water. /Source of elevated radiological constituents in ground water not adequately determined.	Collect ground water from monitoring wells in areas previously found to have gross alpha levels equal or greater than 5 pci/L and/or gross beta levels equal or greater than 50 pci/L, and perform specific radiological isotope analysis.
Surface Water	Determine if there is an upgradient source for the constituents that have been detected in surface water above ARAR values and determine temporal variation in surface water quality. /Upgradient samples not previously collected and analyzed for contaminants. No previous sampling was performed during storm (high flow) events.	Collect another round of surface water samples during a storm event and add several additional upgradient sample locations.
Sediment	Confirm the relatively low concentrations of pesticides detected in wetland sediments and provide additional pesticide analytical data for comparison with Area A downstream sediments; collect additional health and ecological risk data. /Source of elevated pesticides detected in downstream sediments was not identified in the wetland area.	Collect and analyze sediment samples. Each sediment sample will be screened for pesticides in the field using a portable gas chromatograph. Selected samples will be collected for laboratory analysis.
	Area A Downstream/OBDA	
Hydrogeologic Investigation	Further define ground water flow directions and calculate hydraulic gradients near North Lake; determine whether temporal fluctuations occur in ground water flow directions; determine extent of ground water contamination. /Temporal fluctuation of ground water has not been fully evaluated for this area.	Install monitoring wells and measure water levels from select wells on a monthly basis for one year; residential wells as specified in Field Sampling Plan.
Chemical Investigation Ground Water	Define lateral and vertical extent and degree of ground water contamination; collect additional health and ecological risk data. /Lateral and vertical extent and degree of ground water contamination has not been fully evaluated for this area.	Conduct two ground water sampling and analysis rounds from existing and proposed wells (second sampling round will be conducted three months after the first round).
	Determine the source of radiological constituents (natural or anthropogenic) detected in ground water; collect additional health and ecological risk data. /Source of elevated radiological constituents in ground water have not been independently verified.	Collect ground water from monitoring wells in areas previously found to have gross alpha levels equal or greater than 5 pci/L and/or gross beta levels equal or greater than 50 pci/L, and perform specific radiological analysis.

TABLE 7-19 (continued)
AREA A
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives	Action
Surface Water	Continued monitoring of North Lake surface water quality.	Collect and analyze surface water samples from North Lake.
	Define concentrations of any chemical in surface water collected from areas where ground water seeps into North Lake.	Collect and analyze surface water samples from North Lake seeps (samples will be collected when the lake is drained preferably prior to filling in early spring or soon after draining in the fall).
	Determine if there is an upgradient source for the constituents that have been detected in surface water above ARAR values and determine temporal variation in surface water quality. /Upgradient samples not previously collected and analyzed for contaminants. No previous sampling was performed during storm (high flow) events.	Collect another round of surface water samples during a storm event and add several additional upgradient sample locations.
Surficial Soil	Further define extent of pesticide contamination identified in surficial soil samples from the Area A downstream watercourse; collect additional health and ecological risk data. /Extent of pesticide contamination has not been fully determined.	Collect and analyze surficial soil collected from hand augers. Each soil sample will be field screened for pesticides. Selected samples will be collected for laboratory analysis.
Sediments	Define concentrations of pesticides in sediments collected from areas where ground water seeps into North Lake and from Area A downstream ponds; collect additional health and ecological risk data. /North Lake sediments have not been tested during drained conditions fully.	Collect and analyze sediment samples from proposed sediment sample locations (samples will be collected during non-summer months and/or when the lake is drained). Each sediment sample (excluding North Lake) will be screened for pesticides in the field using a portable gas chromatograph. Selected samples will be collected for laboratory analysis.
Quantitative Ecological Investigation	Delineate areas where contaminants in soil have demonstrable effects of soil organisms. /A quantitative ecological investigation has not been performed in this area.	Perform bioassays using introduced earthworms.
	Delineate areas where contaminants in sediment may have demonstrable effects on invertebrates. /A quantitative ecological investigation has not been performed in this area.	Perform bioassays using introduced earthworms.
	Define community parameters such as numerical density, numerically dominant species, species evenness, and number of species. /A quantitative ecological investigation has not been performed in this area.	Collect samples of benthic organisms and identify individuals to lowest taxonomic category practicable.
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study evaluation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil, sediment and ground water samples for specified engineering characteristic parameters.
	Weapons Center	
Hydrogeologic Investigation	Further define ground water flow directions and calculate hydraulic gradients; determine whether seasonal or temporal fluctuations occur in ground water flow directions. /Ground water flow direction has not been measured.	Install monitoring wells and measure water levels from select wells on a monthly basis for one year; residential wells as specified in Field Sampling Plan.

TABLE 7-19 (continued)
AREA A
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives	Action
Chemical Investigation Ground Water	Determine source of elevated levels of cyanide and PAHs at Weapons Center and southeast of Weapons Center. /Source of previously detected PAHs and cyanide has not been determined.	Conduct two ground water sampling and analysis rounds from proposed and existing wells, and compare results to expected waste characteristics and background concentrations.
Subsurface Soil	Evaluate subsurface soil quality to assess potential source areas; collect additional health and ecological risk data. /Source areas of elevated PAHs and cyanide have not been determined.	Collect and analyze subsurface soil samples from proposed borings.
Sediments	Evaluate sediment chemical characteristics at site. /Sediment quality has not been fully characterized.	Collect and analyze sediment samples from proposed sediment sample locations.
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study evaluation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil, sediment and ground water samples for specified engineering characteristic parameters.

Note: Shaded areas will not be completed by Halliburton NUS.

TABLE 7-20
AREA A
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Detected in soil, sediment, and water samples collected during Step I.
SVOC[2]	●	Detected in soil, sediment, and ground water samples collected during Step I.
Inorganics[3]	●	Detected in soil, sediment, and water samples collected during Step I.
Pesticides	●	Detected in sediments, surface water, and surface soil samples collected during Step I, but not detected in ground water. Not included in proposed ground water analysis.
PCB[4]	●	Detected in sediments and surface soil samples collected during Step I but not detected in surface or ground water except at one well location. Not included in proposed ground water analysis.
TCLP[5]	●	Determine hazardous waste characteristics for selected samples.
Radiological Analyses[6]	●	Alpha and beta radiation above screening levels detected in ground water samples collected during Step I.
Dioxins[7]	●	Dibenzofuran detected in soils and sediment samples collected during Step I.
Engineering Characteristics[8]	●	Feasibility study data requirements for select samples.

Notes:

1. VOC means volatile organic compound listed in the CLP TCL.
2. SVOC means semi-volatile organic compound listed in the CLP TCL.
3. Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.
4. PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.
5. TCLP means toxicity characteristic leaching procedures.
6. Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.
7. Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.
8. Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total). At this site, all sediment samples will be analyzed for TOC and grain size.

TABLE 7-21
AREA A FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil (No. of Samples)	Sediment (No. of Samples)	Water (No. of Samples)	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	Dioxin	RAD[4]	Engineering[5]
Monitoring Wells															
27 Existing wells	Existing	Sample all existing wells. Only well 2LMW18S analyzed for PCBs to confirm previous analysis.	Existing			27	27	27	27		1				
2LMW7S 2LMW9D 2LMW13D 2LMW18S 2WMW3D 2WMW4D 2DMW11S 2DMW11D 3MW12S 3MW12D	Bedrock and overburden	Existing wells where radiological parameters exceeded screening levels.	2LGW7S 2LGW9D 2LGW13D 2LGW18S 2WGW3D 2WGW4D 2DGW11S 2DGW11D 3GW12S 3GW12D			10								10	
2LMW19D[6] 2LMW19S 2LMW20D[6] 2LMW20S	Bedrock/100' below bedrock surface Overburden/20±'	Further assessment of the ground water flow directions between the southeast portion of Area A Landfill and homes served by private wells near NSB-NLON east gate; evaluate ground water quality.	2LGW19D 2LGW19S 2LGW20D 2LGW20S			4	4	4	4						
2WMW21S 2WMW21D[6] 2WMW22D[6] 2DMW23D	Bedrock/100' below bedrock surface Overburden/20±'	Further assessments of the groundwater flow directions between Area A Wetland and homes serviced by private wells near the east and north NSB-NLON boundaries. Evaluate ground water quality potentially upgradient of affected site areas.	2WGW21S 2WGW21D 2WGW22D 2DGW23D			4	4	4	4						
2WMW5D	Bedrock/20' (minimum penetration of bedrock)	Better define bedrock ground water flow direction within Area A Wetland; evaluate ground water quality.	2WGW5D			1	1	1	1						
2DMW24D 2DMW24S 2DMW25D 2DMW25S 2DMW26D 2DMW26S 2DMW27D 2DMW27S 2DMW28D 2DMW28S 2DMW29S 2DMW30S	Bedrock/20' (minimum penetration of bedrock) Overburden/20±'	Further evaluate extent of ground water contamination downgradient of Area A Landfill; further evaluate ground water quality/hydrology near North Lake.	2DGW24D 2DGW24S 2DGW25D 2DGW25S 2DGW26D 2DGW26S 2DGW27D 2DGW27S 2DGW28D 2DGW28S 2DGW29S 2DGW30S			12	12	12	12						

TABLE 7-21 (continued)
AREA A FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil (No. of Samples)	Sediment (No. of Samples)	Water (No. of Samples)	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP[3]	Dioxin	RAD[4]	Engi-neering[5]
2WCMW1S 2WCMW2S 2WCMW3S	Overburden/20±'	Define ground water flow directions and hydraulic gradients near Weapons Center; evaluate ground water quality.	2WCGW1S 2WCGW2S 2WCGW3S			3	3	3	3						
2WCMW1S 2WCMW2S 2WCMW3S	Overburden/20±'	Provide chemical data for soils collected from the Weapons Center.	2WCMW1S (depth) 2WCMW2S (depth) 2WCMW3S (depth)	3			3	3	3						1
2LPW1S	Overburden pump test/ base of saturated thickness	Located in an area considered to represent the average hydrogeologic conditions of Area A Landfill.	2LPW1S			3	7[7]	3	3		3				3
		Test Borings													
2LTB8 through 2LTB27	NA/15'	Define lateral and vertical extent and degree of contamination identified around Area A concrete pad. Ten soil samples will be collected for analysis based on GC field screening for PCB and organic vapor analyzer screening for VOCs.	2LTB8 (depth) through 2LTB27 (depth)	10			10	10	10	10	10	2			2
2LTB13 2LTB23	NA/15'	Located in landfill area where dibenzofuran and ash have been detected.	2LTB13 (depth) 2LTB23 (depth)	2									2		
2LTB28 through 2LTB32	NA/15'	Optional borings at Area A concrete pad to be installed to determine the lateral extent of soil contamination (if contamination is detected during field screening). Three soil samples will be collected for analysis based on GC field screening for PCB and total organic vapor analyzer screening for VOCs.	2LTB28 (depth) through 2LTB32 (depth)	3			3	3	3	3	3				
2LC1 through 2LC4	NA/15'	Core samples of the pad to determine if it is contaminated.	2LC1 through 2LC4	4							4				
2WCTB1 2WCTB2 2WCTB3 2WCTB4 2WCTB5 2WCTB6 2WCTB7 2WCTB8	NA/15'	Provide chemical data for soils collected from the Weapons Center area.	2WCTB1 (depth) 2WCTB2 (depth) 2WCTB3 (depth) 2WCTB4 (depth) 2WCTB5 (depth) 2WCTB6 (depth) 2WCTB7 (depth) 2WCTB8 (depth)	8			8	8	8	4	4	1			1
2DTB1	NA/10'	Optional boring to be installed if soil gas survey indicates presence of VOCs in vicinity.	2DTB1 (depth)	1			1								

TABLE 7-21 (continued)
AREA A FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil (No. of Samples)	Sediment (No. of Samples)	Water (No. of Samples)	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP[3]	Dioxin	RAD[4]	Engi-neering[5]
		Subtotal Soil Samples		14			12	11	11	4	4	1	2	0	2
		Subtotal Ground Water Sampling[6]				64	58	54	54	0	4	0	0	10	3
Sediment Sampling															
2WSD10 through 2WSD22 and 2WSD27 through 2WSD42	0-1' Below sediment surface	Provide additional pesticide analytical data in Area A wetland to confirm that elevated levels of pesticides are not present. Six soil samples will be collected for analysis based on GC field screening for pesticides.	2WSD10 (0-1') through 2WSD22 and 2WSD27 through 2WSD42 (0-1')		6					6		1			1
2WSD23 through 2WSD26	0-1' below sediment surface	Provide additional pesticide analytical data in Area A wetland to confirm that elevated levels of pesticides are not present. Four soil samples will be collected for analysis based on GC field screening for pesticides.	2WSD23 (0-1') through 2WSD26		4					4		0			0
2DSD14 through 2DSD29 3SD3A 3SD4A 3SD5A 3SD7	0' to base of sediments at the following intervals 0-1', 1-3', and 3-5'	Define lateral and vertical extent and degree of pesticides in Area A downstream pond sediments. Ten soil samples will be collected for analysis based on GC field screening for pesticides. Full CLP analysis to be performed on samples 2DSD24 through 2DSD29.	2DSD14 (depth) through 2DSD29 (depth) 3SD3A 3SD4A 3SD5A 3SD7		10		6	6	6	10	6	1			5
2DSD30	0-1'	At ground water seep into North Lake.	2DSD30		1		1	1	1	1	1				
2DSD31	0-1'	At ground water seep into North Lake.	2DSD31		1		1	1	1	1	1				
2DSD32	0-1'	At ground water seep into North Lake.	2DSD32		1		1	1	1	1	1				
2WCSD1 through 2WCSD15 less 2WCSD11	0-1'	Provide chemical data for sediments collected from areas of surface water flow from the Weapons Center; samples for VOC, PCB, and pesticide analysis selected at culvert outlets and upgradient locations within Weapons Center.	2WCSD1 through 2WCSD15		14		6	14	14	6	6	1			2
2WCSD11	0-1'	Located in area where dibenzofurans have been detected.	2WCSD11*		1			1	1				1		
3SD6	0' to base of sediments	Located in area where dibenzofurans have been detected.	3SD6 (depth)		1								1		
		Subtotal Sediment Sampling		0	25	0	9	18	18	15	9	2	2	0	3

TABLE 7-21 (continued)
AREA A FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]									
				Soil (No. of Samples)	Sediment (No. of Samples)	Water (No. of Samples)	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	Dioxin	RAD[4]	Engineering[5]
Surface Soil Sampling															
2DSS1 through 2DSS18	0-6" below grade	Provide chemical data for surficial soil samples from Area A downstream watercourse. Four surface soil samples will be collected for analysis based on GC field screening for pesticides.	2DSS1 (0-6") through 2DSS18 (0-6")	5						5					
2DSS19 through 2DSS23	0-6" below grade	Optional sample locations to be installed (if required) to determine the lateral extent of soil contamination. If additional contamination is detected during field screening, two surface soil samples will be collected for analysis based on GC field screening for pesticides.	2DSS19 (0-6") through 2DSS23 (0-6")	2						2					
		Subtotal Surface Soil		0	0	0	0	0	0	0	0	0	0	0	0
Surface Water															
2WSW1	Existing	Upgradient adjacent to wetland.	2WSW1[10]			1	1		1	1					
2WSW2	Existing	At wetland outlet.	2WSW2[10]			1	1	1	1	1	1				
2WCSW3		Upgradient of wetland at stormwater under drain outlet from Weapons Center.	2WCSW3[10]			1	1	1	1	1	1				
2WCSW4		Upgradient of wetland at outlet from Weapons Center storm drain.	2WCSW4[10]			1	1	1	1	1	1				
2WCSW5		Upgradient of wetland at outlet from Weapons Center storm drain.	2WCSW5[10]			1	1	1	1	1	1				
2WSW6		Northeast section of wetland.	2WSW6[10]			1	1		1	1					
2WSW7		Upgradient of wetlands in small drainage swale from Route 12.	2WSW7[10]			1	1		1	1					
2WSW8 2WSW9		Upgradient of wetland at stormwater outlets from "urban areas".	2WSW8[10] 2WSW9[10]			2	2		2	2					
2WSW11		From pond in Area A wetland.	2WSW11[10]			1	1		1	1					
2WSW10 2WSW12		Upgradient of wetland at stormwater outlet.	2WSW10[10] 2WSW12[10]			2	2		2	2					
2DSW2-5 2DSW7 2DSW9-11	Existing	Surface water sample locations previously sampled during Phase I which were located to measure water quality at various locations in Area A downstream surface waters; 2DSW9 and 2DSW11 analyzed for SVOCs and PCBs.	2DSW2-5[10] 2DSW7[10] 2DSW9-11[10]			8	8	2	8	8	2				
2DSW14		Upgradient of Area A downstream at stormwater outfall.	2DSW14[10]			1	1		1	1					

TABLE 7-21 (continued)
AREA A FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type			Analysis[1]								
				Soil (No. of Samples)	Sediment (No. of Samples)	Water (No. of Samples)	VOC	SVOC	Inorganics[2]	Pesticides	PCB	TCLP[3]	Dioxin	RAD[4]	Engineering[5]
2DSW15		Upgradient of Area A downstream at outfall from Torpedo Shops.	2DSW15[10]			1	1		1	1					
7SW1	Existing	At downgradient location in Torpedo Shops. (Tabulated under Torpedo Shops.)	7SW1[10]												
2DSW30-32		At ground water seep into North Lake.	2DSW30-32[10]			3	3	3	3	3	3				
		Subtotal Surface Water				25	25	9	25	25	9	0	0	0	0
		Total Solids		**14**	**25**		**21**	**29**	**29**	**19**	**13**	**3**	**4**	**0**	**5**
		Total Water[9]				**150**	**134**	**114**	**130**	**25**	**14**	**0**	**0**	**17**	**6**

PROPOSED

38 Primary test borings (including well borings)
1 Supplemental test borings
28 Wells
- 11 Deep bedrock wells
- 17 Shallow overburden wells

Notes:

[1] Rinsate blanks are to be analyzed for all parameters for which analyses are shown.
[2] TAL metals plus boron. Groundwater samples are to be analyzed for total and dissolved TAL metals plus Boron. Surface waters are to be analyzed for dissolved TAL metals and Boron only.
[3] Except for one sample obtained from the Spent Acid Storage and Disposal Area; and two samples obtained from the Lower Subase; all TCLP analyses indicated are for TCLP-extract metals only.
[4] RAD means gamma spectrum analysis and gross alpha/gross beta analysis. One sample round only.
[5] Engineering characteristics for sediments to be analyzed for grain size and total organic carbon; soils are to be analyzed for grain size, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon; groundwater and surface water are to be analyzed for biochemical oxygen demand (5 day), chemical oxygen demand, total oragnic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia, and phosphorus (total). All sediment samples will be analyzed for grain size and TOC.
[6] 100 feet penetration of bedrock to be representative of offsite residential well construction.
[7] VOC samples should be collected at the following pump test intervals: start, 1 hour, 2 hours, 4 hours, 8 hours, 16 hours, and conclusion.
[8] Subtotal includes one sampling round.
[9] Total includes two sampling rounds.

Shaded areas will not be completed by Halliburton NUS.

TABLE 7-21 (continued)
AREA A FIELD SAMPLING PLAN

ECOLOGICAL SAMPLING

Sample Type	Location	Sample Quantity				Analysis
		Tissue	Soil	Sediment	Bioassays	
Area A - Qualitative Survey						
Qualitative soil invertebrate survey	Wetland, Downstream, OBDA					Qualitative
Fish	Downstream ponds	3[1]				Qualitative/Pesticides
Area A - Quantitative Survey						
Native earthworms and soils	Downstream	5	5[3]			Pesticides
In situ earthworm bioassays in soils/wetland sediment	Wetland, Downstream, OBDA				15-20	—
Introduced earthworms from bioassays and soils/wetland sediment	Wetland, Downstream, OBDA	5	5[3]			Pesticides
Earthworm bioassays in pond sediment	Downstream watercourses			6[3]	9[3]	Pesticides (sediment only)
Introduced earthworms from bioassays	Downstream watercourses	3				Pesticides
Frogs	Downstream ponds and streams	9				Pesticides
Benthic invertebrates and reference location	Downstream ponds and streams	18		18[3]		Quantitative benthic analysis, reference area sediments for pesticides

Notes:

[1] If larger fish are found, separate analysis will be conducted for tissue and liver for a total of six analyses.

[2] Includes three reference locations.

[3] Analysis included in Area A field sampling plan.

Shaded areas will not be completed by Halliburton NUS.

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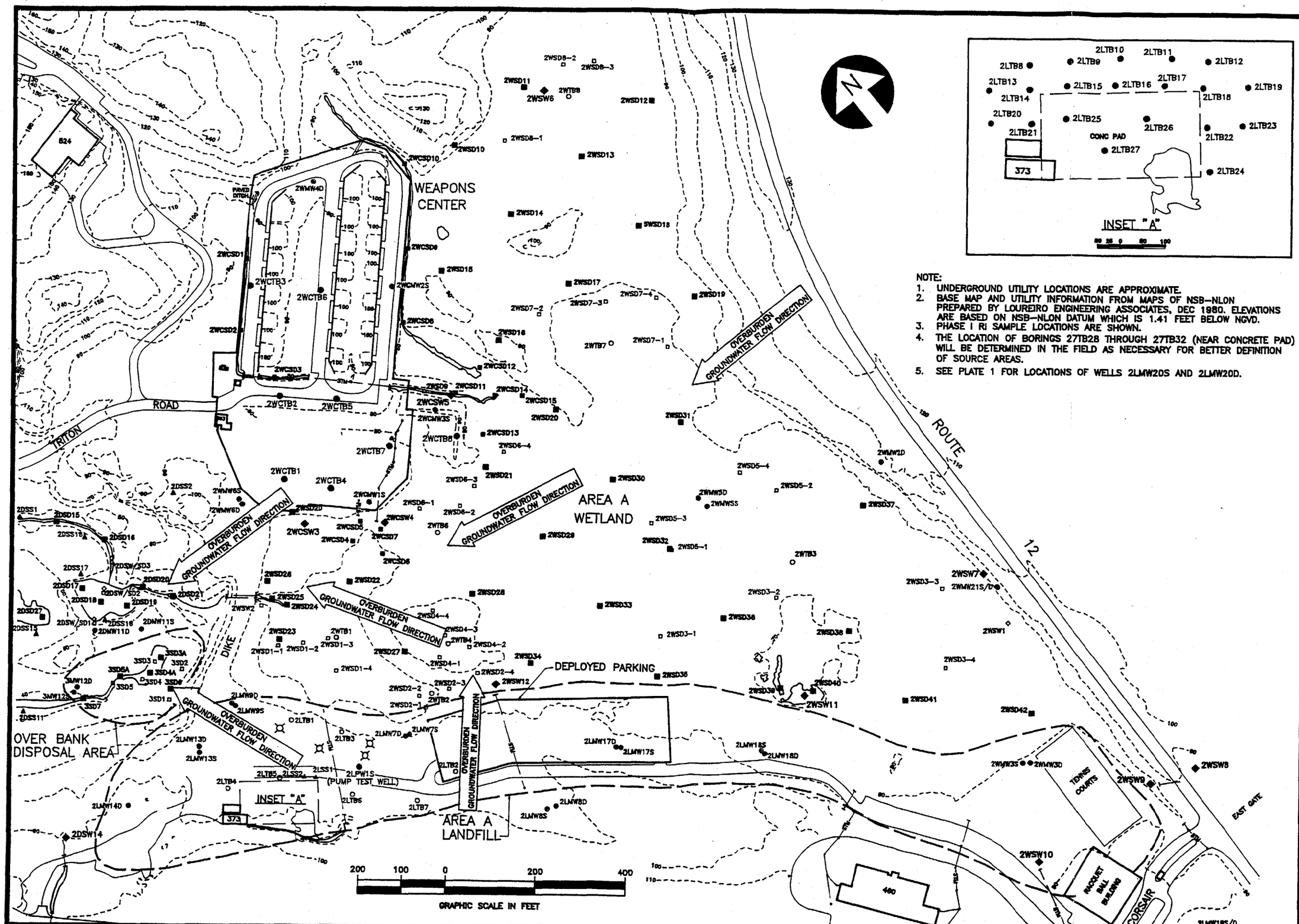


NOTE:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON PREPARED BY LOUREIRO ENGINEERING ASSOCIATES, DEC 1980. ELEVATIONS ARE BASED ON NSB–NLON DATUM WHICH IS 1.41 FEET BELOW NGVD.
3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.
4. THE LOCATION OF BORINGS 27TB28 THROUGH 27TB32 (NEAR CONCRETE PAD) WILL BE DETERMINED IN THE FIELD AS NECESSARY FOR BETTER DEFINITION OF SOURCE AREAS.
5. SEE PLATE 1 FOR LOCATIONS OF WELLS 2LMW20S AND 2LMW20D.

FIGURE 7–7
FIELD SAMPLING PLAN
AREA A LANDFILL, WETLAND AND WEAPONS CENTER

ATLANTIC ENVIRONMENTAL SERVICES, INC.

LEGEND

EXIST	PROP.	
		EXIST CONTOUR
	123	BUILDING No.
		WATERCOURSE
		STORM SEWER
		CATCH BASIN
⊕ 6MW1	⊕ 7MW5	MONITORING WELL
○ 6TB1	● 7TB5	TEST BORING
□ 2DSD1	■ 2DSD5	SEDIMENT SAMPLE
△ 6SS1	▲ 7SS5	SURFACE SOIL SAMPLE
◇ 2DSW1	◆ 2DSW5	SURFACE WATER SAMPLE
		DRAWDOWN OBSERVATION WELL

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE–NEW LONDON
GROTON, CONN.

06271102Z

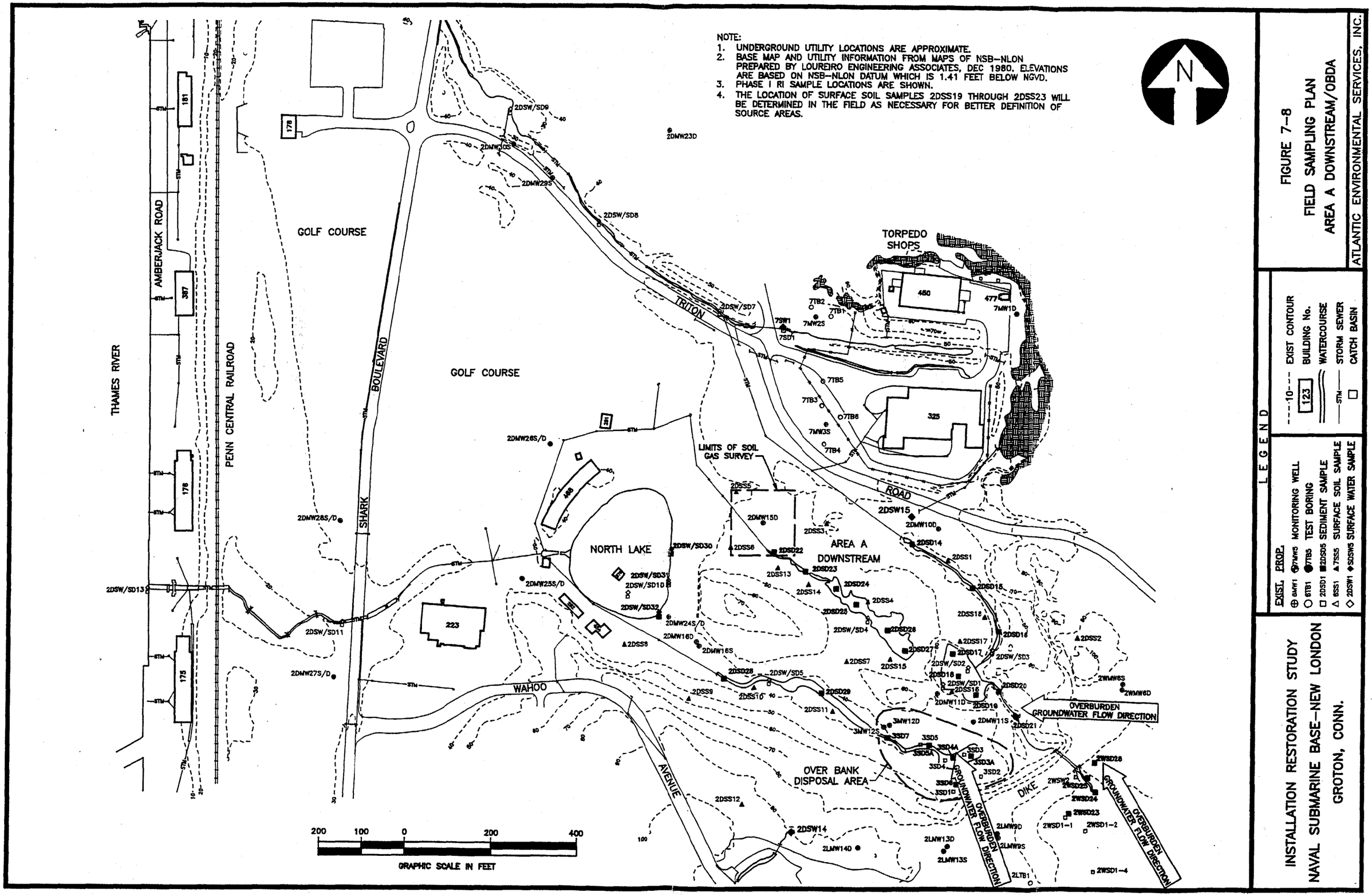


FIGURE 7-8
FIELD SAMPLING PLAN
AREA A DOWNSTREAM/OBDA

ATLANTIC ENVIRONMENTAL SERVICES, INC.

LEGEND

EXIST.	PROP.	
⊕ 6MW1	⊕ 7MW5	MONITORING WELL
○ 6TB1	● 7TB5	TEST BORING
□ 2DSD1	■ 2DSD5	SEDIMENT SAMPLE
△ 6SS1	▲ 7SS5	SURFACE SOIL SAMPLE
◇ 2DSW1	◆ 5DSW5	SURFACE WATER SAMPLE

---10--- EXIST CONTOUR
123 BUILDING No.
WATERCOURSE
—STM— STORM SEWER
CATCH BASIN

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE-NEW LONDON
GROTON, CONN.

06271 1032

- Update human health risk assessment based on additional collected data.

  - the human health risk assessment is discussed in Section 4.0

The remedial action objectives and associated investigative actions are included in Table 7-22. The rationale for selection of constituents for analysis is provided in Table 7-23. Table 7-24 provides details of the field sampling plan including location, number and type of samples; location rationale; and analysis requirements.

Figure 7-9, Plate 1 and Plate 2 illustrate the proposed sample locations.

7.3.3 Lower Subase

The site investigation's specific goals are summarized below; the goals address the recommendations of the Phase I RI report and Technical Review Committee comments.

- Determine the nature and extent of lead contamination in area identified during the Phase I RI.

- Determine the extent of subsurface free product near Bower House underground storage tanks.

- Further evaluate ground water quality to confirm previous sampling round results and confirm previous assumptions made regarding SVOC ground water concentrations used in the Phase I RI; ground water quality data will also be used for the Thames River ecological assessment.

- Update human health risk assessment based on additional collected data.

The remedial action objectives and associated investigative actions are included in Table 7-25. The rationale for selection of constituents for analysis is provided in Table 7-26. Table 7-27 provides details of the field sampling plan including location, number and type of samples; location rationale; and analysis requirements.

Figure 7-10 illustrates the proposed sample locations.

The general approach for the supplemental Step II investigation at the Lower Subase is as follows. The primary focus of this investigation is to further define the extent of lead contamination in soils. The field investigations will rely heavily on XRF analysis in the field to select samples and determine the need for supplemental borings. In addition to this focussed investigation of lead contamination in soils, another two rounds of ground water samples will be collected to confirm previous results and risk assessment assumption, and to define any temporal changes in ground water quality. Ground water quality data will also be used for the Thames River ecological assessment.

TABLE 7-22
DRMO
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations and other geologic features.	Use existing site survey maps to draft site maps using AutoCAD®. Survey sample locations and elevation.
Geological Investigation	Better define stratigraphy below the landfill material and determine depth to bedrock. /Depth to bedrock has not been adequately determined.	Install borings and monitoring wells to bedrock. Core 5 feet into bedrock at locations 6TB17 and 6TB18.
Hydrogeologic Investigation	Further evaluate hydraulic conductivity at the site. /Hydraulic conductivity data for the site have been performed, however, supplemental verification will better define this paramter.	Perform a single well hydraulic conductivity test (6MW4S, 6MW3D). No further tests are required as hydraulic conductivity has been measured during the Phase I RI.
	Determine if there is temporal fluctuation of ground water elevations. /Temporal fluctuation of ground water elevations have not been previously investigated.	Perform ground water elevation measurements prior to each round of sampling at low tide. Collect data to prepare a base-wide ground water elevation map.
	Better define ground water flow directions. /Information regarding flow direction is limited for some areas of the site.	Prepare ground water flow direction maps based on each round of water levels collected.
Chemical Investigation Soils	Determine if dioxins are present in areas where dibenzofuran was previously detected. /Dioxin was not previously analyzed for.	Sample soils near areas where dibenzofurans were previously detected (6TB5, 6TB7).
	Further define the nature, extent and degree of soil contamination within the north portion of the landfill. /Extent and degree of soil contamination has not been adequately characterized.	Collect and analyze soil samples from proposed borings. Plot or contour concentrations of chemicals of concern on site maps.
Ground Water	Determine the source of radiological constituents (natural or anthropogenic) detected in ground water. /Source of elevated radiological constituents in ground water has not been independently verified.	Perform radiological analyses of ground water from the two wells displaying elevated levels in previous sampling rounds (6MW1S, 6MW4S).
	Evaluate potential temporal changes in ground water quality; collect additional health and ecological risk assessment data. /Temporal fluctuation of ground water quality has not been fully characterized.	Perform two rounds of ground water sampling and analyses.
	Determine if a downward migration of contamination has occurred. /Deep bedrock monitoring wells were not previously installed within the site boundaries.	Analyze ground water from both the deep and shallow wells at the site.
	Determine upgradient ground water quality. /Proposed monitoring wells 6MW6D as 6MW6S are located closer to the site and are considered to be better representatiive of upgradient locations for the site.	Sample and analyze ground water from upgradient monitoring wells (6MW6D, 6MW6S).
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study evaluation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil and ground water samples for specified engineering characteristic parameters.

Note: Shaded areas will not be completed by Halliburton NUS.

TABLE 7-23
DRMO
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Detected in soil and ground water samples collected during Step II.
SVOC[2]	●	Detected in soil and ground water samples collected during Step II.
Inorganics[3]	●	Detected in soil and ground water samples collected during Step II.
Pesticides	●	Detected in soil samples collected during Step II, but not ground water. Not included in proposed ground water analysis.
PCB[4]	●	Detected in soil samples collected during Step II, but not ground water. Not included in proposed ground water analysis.
TCLP[5]	●	Determine hazardous waste characteristics for select samples.
Dioxins[6]	●	Dibenzofuran detected in soil samples during Step II.
Radiological Analyses[7]	●	Detected in certain ground water samples collected during Step II. Analyze only for ground water samples exceeding action level in Step II.
Engineering Characteristics[8]	●	Feasibility study data requirements for select samples.

Notes:

1. VOC means volatile organic compound listed in the CLP TCL.
2. SVOC means semi-volatile organic compound listed in the CLP TCL.
3. Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.
4. PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.
5. TCLP means toxicity characteristic leaching procedures.
6. Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.
7. Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.
8. Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).

TABLE 7-24
DRMO FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]								
				Soil	Water	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP[3]	Dioxin	RAD[4]	Engi-neering[5]
			Monitoring Wells											
6MW1S	Existing	Existing	6GW1S		1	1	1	1					1	
6MW2S	Existing	Existing	6GW2S		1	1	1	1						
6MW2D[6]	Overburden/50±' (advance boring to determine bedrock contact)	Monitor quality of deep ground water discharging to river; existing shallow soil analytical data available from 6MW2S.	6GW2D		1	1	1	1						
			6MW2D (depth)	1		1	1	1	1	1				
6MW3S	Existing	Existing	6GW3S		1	1	1	1						1
6MW3D[6]	Overburden/50±' (advance boring to determine bedrock contact)	Monitor quality of deep ground water discharging to river; existing shallow soil analytical data available from 6MW3S.	6GW3D		1	1	1	1						
			6MW3D (depth)	1		1	1	1	1	1				1
6MW4S	Existing	Existing	6GW4S		1	1	1	1					1	
6MW5S	Existing	Replaced with new upgradient well 6MW6S												
6MW5D	Existing	Replaced with new upgradient well 6MW6D												
6MW6S	Overburden/20±'	Monitor quality of ground water upgradient of site.	6MW6S (depth)	1		1	1	1	1	1				
			6GW6S		1	1	1	1						
6MW6D[6]	Overburden/50±' (advance boring to determine bedrock contact)	Monitor quality of deep ground water upgradient of site.	6GW6D		1	1	1	1						
6MW7S	Overburden /20±'	Evaluate ground water quality in the southeast portion of the site; ground water elevation data.	6MW7S (depth)	1		1	1	1	1	1				
			6GW7S		1	1	1	1						
6MW8S	Overburden /20±'	Evaluate ground water quality in the vicinity of previously detected contaminants.	6MW8S (depth)	1		1	1	1			1			
			6GW8S		1	1								
			Test Borings											
6TB8	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow sample from unpaved area.	6TB8 (0-1)	1		1	1	1	1	1				
			6TB8 (depth)	1		1	1	1	1	1				
6TB9	NA/Base of fill (15±')	Further define the extent and degree of contamination.	6TB9 (depth)	1		1	1	1	1	1				
6TB10	NA/Base of fill (15±')	Further define the extent and degree of contamination.	6TB10 (depth)	1		1	1	1	1	1				
6TB11	NA/Base of fill (15±')	Further define the extent and degree of contamination.	6TB11 (depth)	1		1	1	1	1	1				
6TB12	NA/Base of fill (15±')	Further define the extent and degree of contamination.	6TB12 (depth)	1		1	1	1	1	1				
6TB13	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow samples near area of contamination.	6TB13 (0-1)	1		1	1	1	1	1				
			6TB13 (depth)	1		1	1	1	1	1				

TABLE 7-24 (continued)
DRMO FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]								
				Soil	Water	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP[3]	Dioxin	RAD[4]	Engi-neering[5]
6TB14	NA/Base of fill (15±')	Further define the extent and degree of contamination.	6TB14 (depth)	1		1	1	1	1	1				
6TB15	NA/Base of fill (15±')	Further define the extent and degree of contamination.	6TB15 (depth)	1		1	1	1	1	1				
6TB16	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow sample from unpaved area.	6TB16 (0-1)	1		1	1	1	1	1				
			6TB16 (depth)	1		1	1	1	1	1				1
6TB17	NA/Base of fill (15±')	Further define the extent and degree of contamination.	6TB17 (depth)	1		1	1	1	1	1				
6TB18	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow sample from unpaved area.	6TB18 (0-1)	1		1	1	1	1	1				
			6TB18 (depth)	1		1	1	1	1	1				
6TB19	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow sample from unpaved area.	6TB19 (0-1)	1		1	1	1	1	1				
			6TB19 (depth)	1		1	1	1	1	1				
6TB20	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow sample from unpaved area.	6TB20 (0-1)	1		1	1	1	1	1				
			6TB20 (depth)	1		1	1	1	1	1	1	1		1
6TB21	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow surface soil data available at 6S82C.	6TB21 (depth)	1		1	1	1	1	1		1		1
6TB22	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow surface soil data available at 6SS1C.	6TB22 (depth)	1		1	1	1	1	1				1
6TB23	NA/Base of fill (15±')	Further define the extent and degree of contamination. Shallow surface soil data available at 6SS1C.	6TB23 (0-10)	1		1	1	1	1	1				
6TB24-6TB28	NA/Base of fill (15±')	Optional resolution borings to be installed to determine extent of soil contamination, if required, based upon the field screening results.	6TB24-28 (depth)	5		5	5	5	5	5				
			Subtotal Soil	5		5	5	5	4	4	1	0	0	1
			Subtotal Ground Water[7]		10	10	9	9	0	0	0	0	2	1
			Total Soil	**5**		**5**	**5**	**5**	**4**	**4**	**1**	**0**	**0**	**1**
			Total Ground Water[8]		**20**	**20**	**18**	**18**	**0**	**0**	**0**	**0**	**2**	**2**

TABLE 7-24 (continued)
DRMO FIELD SAMPLING PLAN

Sample Location	Well Type/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]								
				Soil	Water	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	TCLP[3]	Dioxin	RAD[4]	Engi-neering[5]
PROPOSED 6 Wells 3 - Shallow overburden 3 - Deep overburden or bedrock														

Notes:

(1) Rinsate Blanks are to be analyzed for all analytical parameters for which analyses are shown.

(2) TAL metals plus Boron. Groundwater samples are to be analyzed for both total and dissolved TAL metals and Boron. Surface waters are to be analyzed dissolved TAL metals and Boron only.

(3) Except for one sample obtained from the Spent Acid Storage and Disposal Area; and two samples from the Lower Subase; all TCLP analyses indicated are for TCLP-extract metals only.

(4) RAD means gamma spectrum analysis and gross alpha/beta analysis. One sample round only.

(5) Engineering characteristics for soils/sediments include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon; groundwaters and surface water engineering characteristics include biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia, and phosphorus (total).

(6) Bedrock well may be installed, see Field Sampling Plan for details.

(7) One round of sampling.

(8) Includes two sampling rounds.

Shaded areas will not be completed by Halliburton NUS.

TABLE 7-25
LOWER SUBASE
REMEDIAL INVESTIGATION OBJECTIVES

Activity	Objectives/Data Gaps	Action
Site Mapping	Map proposed sample locations.	Use existing site survey maps to draft site maps using AutoCAD®. Survey sample locations and elevations.
Chemical Investigation Soils	Determine extent and degree of lead contamination. /Extent and degree of lead contamination not fully characterized at the site.	Perform borings and collect samples continuously to bottom of fill (15± feet). Analyze samples for total lead, TCLP lead, and TPH. Samples selected for analysis will be based upon XRF field screening results.
	Determine if free product exists near power house (Building 29) underground storage tanks. /No wells exist at a location where oil was observed in an excavation.	Install one well in the area where subsurface oil was observed in an excavation. If recoverable amounts of free product are present, install seven additional wells to determine the extent of petroleum and VOC contamination. Inspect this well on a monthly basis for product thickness.
Ground Water	Determine whether temporal fluctuations in chemical quality occur in ground water and the extent of VOC contamination. Confirm first round of analytical data and previous assumptions made regarding SVOC concentrations in ground water. /Temporal fluctuation of ground water quality has not been fully evaluated.	Perform two additional rounds of ground water monitoring and analyze for all TCL and TAL parameters including VOC.
Engineering Investigation	Determine soil physical properties and ground water quality properties for use in Feasibility Study evaluation. /No information exists regarding specific engineering characteristics of site soils and water.	Collect and analyze select soil and ground water samples for specified engineering characteristic parameters.

TABLE 7-26
LOWER SUBASE
RATIONALE FOR SELECTION OF CONSTITUENTS FOR ANALYSIS

Parameter	Selected	Rationale
VOC[1]	●	Detected in soil and ground water samples during Step II.
SVOC[2]	●	SVOCs could be present in ground water; not previously analyzed.
Inorganics[3]	●	Detected in soil and ground water during Step II.
Pesticides		Not suspected to be present.
PCB[4]		Not suspected to be present.
TCLP[5]	●	Determine hazardous waste characteristics for select soil samples.
Radiological Analyses[6]		Radiological constituents are not suspected at this site.
Dioxin[7]		Historically, volatile organic compounds have not been burned at this site.
Engineering Characteristics[8]	●	Feasibility study data requirements for select samples.
TPH[9]	●	Useful in determining extent of petroleum contamination.

Notes:

1 VOC means volatile organic compound listed in the CLP TCL.

2 SVOC means semi-volatile organic compound listed in the CLP TCL.

3 Inorganics include total and dissolved inorganics for ground water samples and dissolved inorganics for surface water. All CLP TAL compounds and boron are included in this category.

4 PCB means polychlorinated biphenyl. All arochlors in the CLP TCL will be analyzed.

5 TCLP means toxicity characteristic leaching procedures.

6 Radiological analyses include gross alpha and beta and a complete gamma spectrum analysis.

7 Dioxin analysis includes dioxins and dibenzofurans as specified in U.S. EPA CLP SOW DFLM01.0.

8 Engineering characteristics for soils include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon content; and for ground water includes biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solids, hardness, ammonia (as nitrogen) and phosphorus (total).

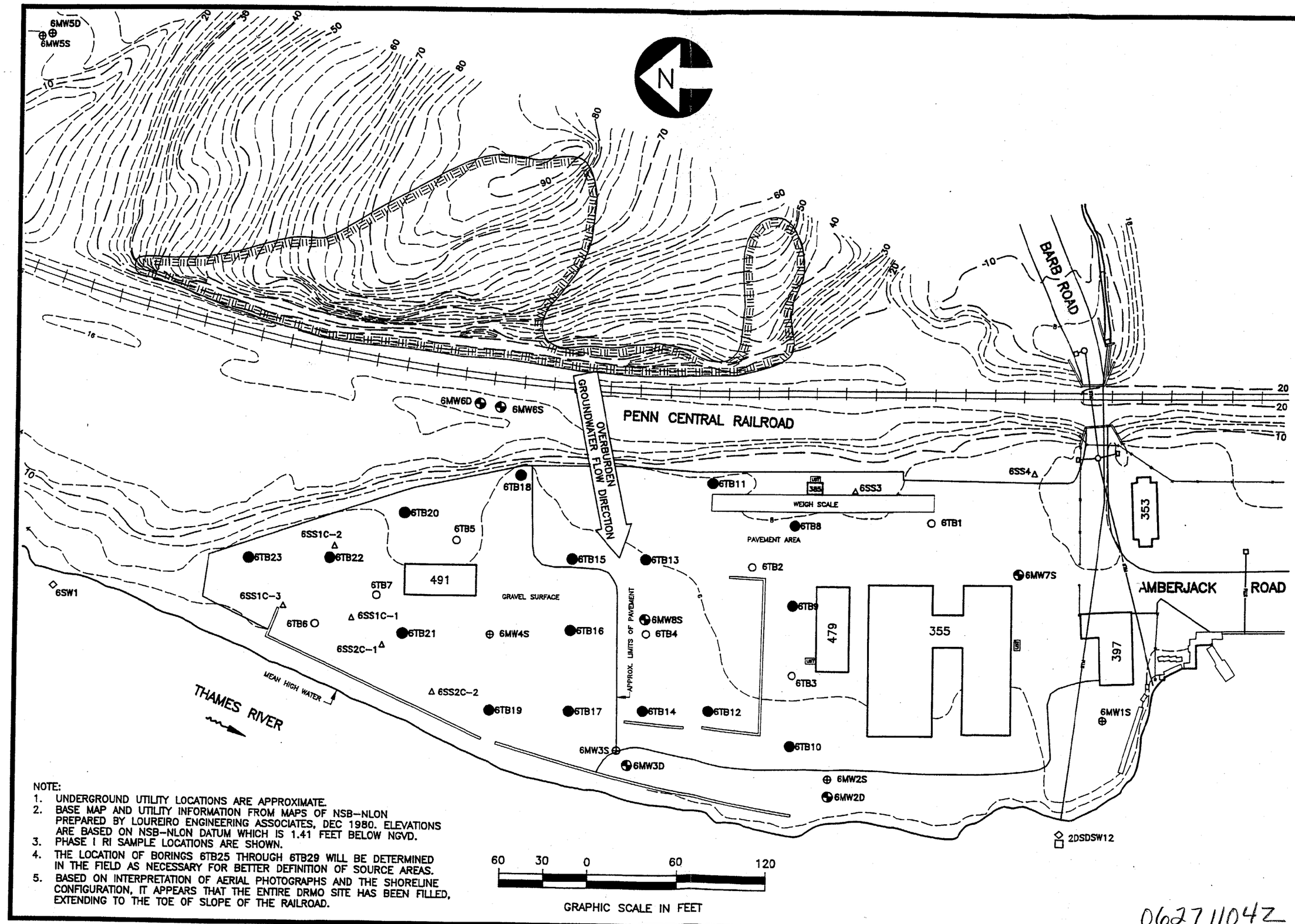
9 TPH means total petroleum hydrocarbons.

TABLE 7-27
LOWER SUBASE FIELD SAMPLING PLAN

Sample Location	Well Depth/ Proposed Depth (ft)	Rationale	Sample Designations	Sample Type		Analysis[1]								
				Soil	Water	VOC	SVOC	Inor-ganics[2]	Pesti-cides	PCB	Lead	TCLP[3]	TPH	Engi-neering[4]
13TB2A-5A	15 feet or bottom of sand and gravel fill layer, whichever is deeper	At and around 13MW11 and 13MW16 where high TCLP lead was detected during the Phase I RI.	13TB2A-5A (depth)	4							4	4	4	1
13TB6-12	15 feet or bottom of sand and gravel fill layer, whichever is deeper	At and around 13MW11 and 13MW16 where high TCLP lead was detected during the Phase I RI.	13TB6-12 (depth)	7							7	7	7	1
13TB13-13TB17	15 feet or bottom of sand and gravel fill layer, whichever is deeper	At and around 13MW4 where high TCLP lead was detected during Phase I RI	13TB13-17 (depth)	5							5	5	5	
WE-4A	15 feet or bottom of sand and gravel fill layer, whichever is deeper.	At and around 13MW11 and 13MW16 where high TCLP lead was detected during the Phase I RI.	WE-4A (depth)	1							1	1	1	
13TB18-22	15 feet or bottom of sand and gravel fill layer, whichever is deeper.	Optional resolution borings to be installed to determine full extent of soil contamination if detected based upon field screening.	13TB18-22 (depth)	5							5	5	5	
24 existing monitoring wells	NA	Existing wells			24	24	24	24					24	1
13MW18	15 feet or 10 feet below ground water elevation, whichever is deeper.	At location where oil was observed in an excavation.	13GW18		1	1	1	1					1	
13MW19-25	15 feet or 10 feet below ground water elevation, whichever is deeper.	Optional wells to be installed to determine extent of recoverable product if detected in 13MW18.	13GW19-25		7	7	7	7					7	
			Subtotal Soil	22		0	0	0	0	0	22	22	22	2
			Subtotal Ground Water[5]		32	32	32	32	0	0	0	0	32	1
			Total Soils	**22**		**0**	**0**	**0**	**0**	**0**	**22**	**22**	**22**	**2**
			Total Water[6]		**64**	**64**	**64**	**64**	**0**	**0**	**0**	**0**	**64**	**2**

TABLE 7-27 (continued)
LOWER SUBASE FIELD SAMPLING PLAN

				Sample Type	Analysis[1]
PROPOSED 17 Primary test borings 5 Supplemental test borings	Notes: (1) Rinsate Blanks are to be analyzed for all analytical parameters for which analyses are shown. (2) TAL metals plus Boron. Groundwater samples are to be analyzed for both total and dissolved TAL metals and Boron. (3) Of the 22 TCLP analyses, 20 will only include metals and two will include all TCLP constituents. These two samples will be selected from samples that appear to have high levels of contamination based on field screening results. (4) Engineering characteristics for soils/sediments include grain size distribution, moisture content, specific gravity, organic content, cation exchange capacity, pH, and total organic carbon; groundwaters, are to be analyzed for biochemical oxygen demand (5-day), chemical oxygen demand, total organic carbon, oil and grease (hydrocarbon fraction), total suspended solis, hardness, ammonia, and phosphorus (total). (5) Total is for one round of sampling. (6) Total includes 2 rounds of sampling.				



NOTE:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON PREPARED BY LOUREIRO ENGINEERING ASSOCIATES, DEC 1980. ELEVATIONS ARE BASED ON NSB-NLON DATUM WHICH IS 1.41 FEET BELOW NGVD.
3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.
4. THE LOCATION OF BORINGS 6TB25 THROUGH 6TB29 WILL BE DETERMINED IN THE FIELD AS NECESSARY FOR BETTER DEFINITION OF SOURCE AREAS.
5. BASED ON INTERPRETATION OF AERIAL PHOTOGRAPHS AND THE SHORELINE CONFIGURATION, IT APPEARS THAT THE ENTIRE DRMO SITE HAS BEEN FILLED, EXTENDING TO THE TOE OF SLOPE OF THE RAILROAD.

062711042

FIGURE 7-9
FIELD SAMPLING PLAN
DRMO

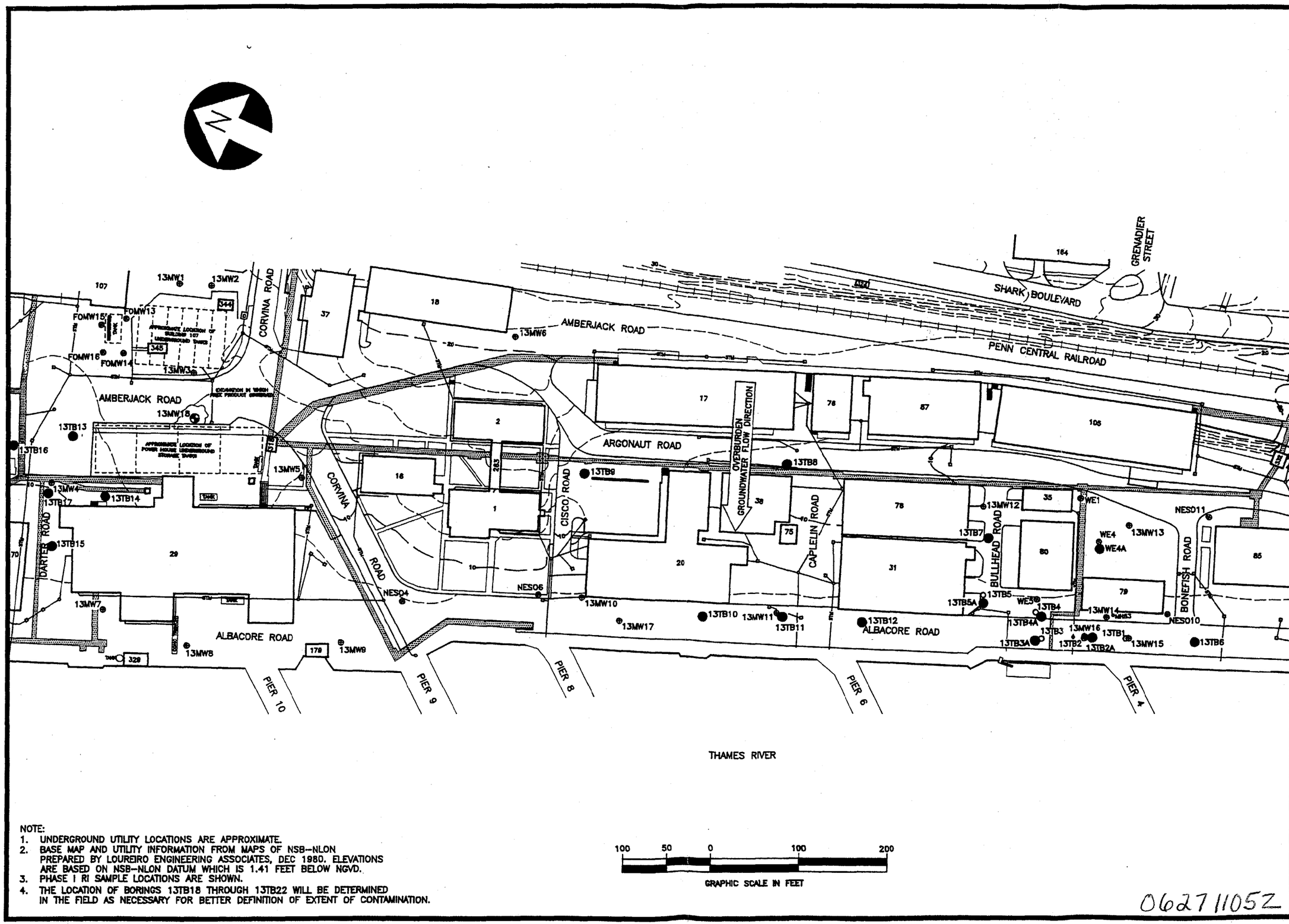
ATLANTIC ENVIRONMENTAL SERVICES, INC.

LEGEND

----10----	EXIST CONTOUR
123	BUILDING No.
	WATERCOURSE
STM	STORM SEWER
	CATCH BASIN

EXIST.	PROP.	
⊕ 6MW1	◐ 7MW5	MONITORING WELL
○ 6TB1	● 7TB5	TEST BORING
□ 2DSD1	■ 2DSD5	SEDIMENT SAMPLE
△ 6SS1	▲ 7SS5	SURFACE SOIL SAMPLE
◇ 2DSW1	◆ 2DSW5	SURFACE WATER SAMPLE

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE-NEW LONDON
GROTON, CONN.



NOTE:
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3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.
4. THE LOCATION OF BORINGS 13TB18 THROUGH 13TB22 WILL BE DETERMINED IN THE FIELD AS NECESSARY FOR BETTER DEFINITION OF EXTENT OF CONTAMINATION.

06271105Z

FIGURE 7–10
FIELD SAMPLING PLAN
LOWER BASE

ATLANTIC ENVIRONMENTAL SERVICES, INC.

LEGEND

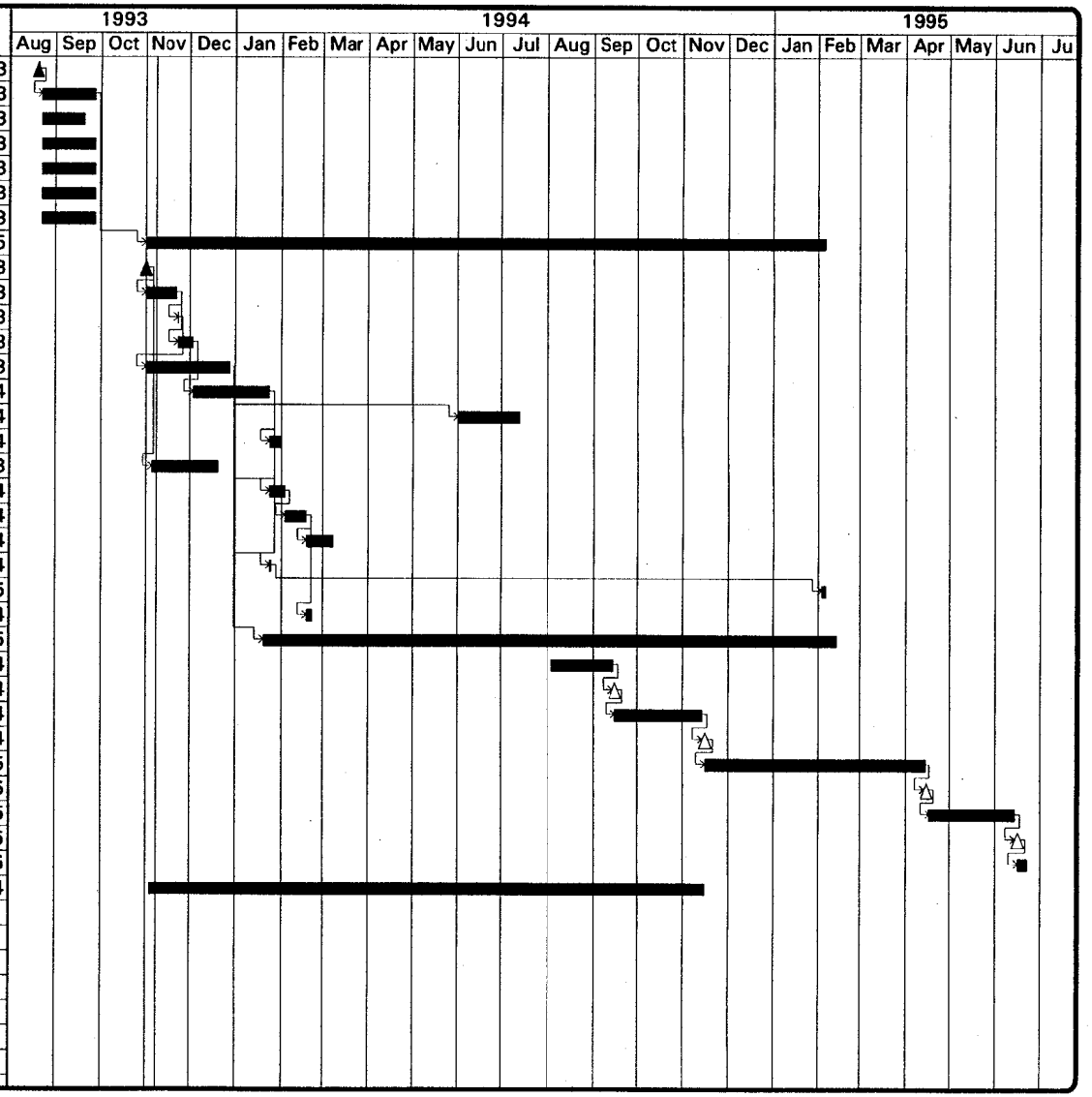
- EXIST CONTOUR
- BUILDING No.
- WATERCOURSE
- STORM SEWER
- CATCH BASIN

EXIST.	PROP.	
6MW1	7MW5	MONITORING WELL
6TB1	7TB5	TEST BORING
2DSD1	2DSD5	SEDIMENT SAMPLE
6SS1	7SS5	SURFACE SOIL SAMPLE
2DSW1	2DSW5	SURFACE WATER SAMPLE

INSTALLATION RESTORATION STUDY
NAVAL SUBMARINE BASE–NEW LONDON
GROTON, CONN.

FIGURE 10-1
Phase II Remedial Investigation
Naval Submarine Base New London

WBS	Task Name	Duration	Start	End
	AWARD DATE	0.00 d	Aug/20/93	Aug/20/93
1.0	PLANNING	25.00 d	Aug/23/93	Sep/27/93
1.1	Spec Preparation	20.00 d	Aug/23/93	Sep/20/93
1.2	WP Addendum	25.00 d	Aug/23/93	Sep/27/93
1.3	FSP Addendum	25.00 d	Aug/23/93	Sep/27/93
1.4	QAPP Addendum	25.00 d	Aug/23/93	Sep/27/93
1.5	HASP Addendum	25.00 d	Aug/23/93	Sep/27/93
2.0	FIELDWORK	319.25 d	Nov/01/93	Feb/06/95
	Begin field work	0.00 d	Nov/01/93	Nov/01/93
2.1	Mobilization	15.00 d	Nov/01/93	Nov/22/93
2.2	Crew 1 surveys	1.00 d	Nov/23/93	Nov/23/93
2.3	Crew 2 surveys	7.50 d	Nov/23/93	Dec/03/93
2.4	Crew 1 drilling	39.50 d	Nov/01/93	Dec/28/93
2.5	Crew 2 drilling	34.75 d	Dec/03/93	Jan/24/94
2.6	Crew 1 soil/sw/sed/air sampling	30.00 d	Jun/01/94	Jul/13/94
2.7	Crew 2 soil/sw/sed sampling	6.00 d	Jan/24/94	Feb/01/94
2.8	Thames river sampling (crew 2)	30.00 d	Nov/05/93	Dec/20/93
2.9	Pumping test (2 crews)	8.32 d	Jan/24/94	Feb/03/94
2.10	Round 1 GW sampling (2 crews)	11.00 d	Feb/03/94	Feb/18/94
2.11	Round 2 GW sampling (2 crews)	11.00 d	Feb/18/94	Mar/08/94
2.12	Water level meas. (1 crew, rd. 1)	1.00 d	Jan/24/94	Jan/25/94
2.13	Water level meas. (1 crew, rd. 2)	1.00 d	Feb/03/95	Feb/06/95
2.14	HC testing (1 crew)	1.00 d	Feb/18/94	Feb/22/94
3.0	EVALUATE DATA	270.00 d	Jan/20/94	Feb/13/95
4.0	PREP ROUGH RI REPORT	30.00 d	Aug/04/94	Sep/15/94
5.0	SUBMIT ROUGH RI REPORT	0.00 d	Sep/15/94	Sep/15/94
6.0	PREPARE DRAFT RI REPORT	40.00 d	Sep/16/94	Nov/14/94
7.0	SUBMIT DRAFT RI REPORT	0.00 d	Nov/15/94	Nov/15/94
8.0	PREPARE DRAFT FINAL RI REPORT	105.00 d	Nov/16/94	Apr/14/95
9.0	SUBMIT DRAFT FINAL RI REPORT	0.00 d	Apr/14/95	Apr/14/95
10.0	PREPARE FINAL RI REPORT	42.00 d	Apr/17/95	Jun/14/95
11.0	SUBMIT FINAL RI REPORT	0.00 d	Jun/15/95	Jun/15/95
12.0	FACT SHEET	5.00 d	Jun/16/95	Jun/22/95
13.0	TRC MEETINGS	260.00 d	Nov/04/93	Nov/15/94



Printed: Nov/08/93
Page 1

Milestone △ Summary ▬
Fixed Delay - - -

Revised Section 11

11.0 PROJECT MANAGEMENT

Specific Halliburton NUS personnel have been identified who are responsible for implementing aspects of the project. Primary responsibility rests with the Project Manager. Figure 11-1 presents the organizational structure for this investigation at NSB-NLON.

The names and addresses of the primary contacts with the Navy are given below.

Engineer-in-Charge

Dave Miu
Northern Division, Naval Facilities Engineering Command
Lester, Pennsylvania
Telephone: (215) 595-0567

Point-of-Contact

Dick Conant
Naval Submarine Base - New London
Groton, CT
Telephone: (203) 449-3644

Responsibilities of Halliburton NUS staff are presented in the following subsections.

11.1 PROGRAM MANAGER

Mr. John Trepanowski is Halliburton NUS' program manager and as such he is responsible for overseeing all technical and administrative activities for all clean projects.

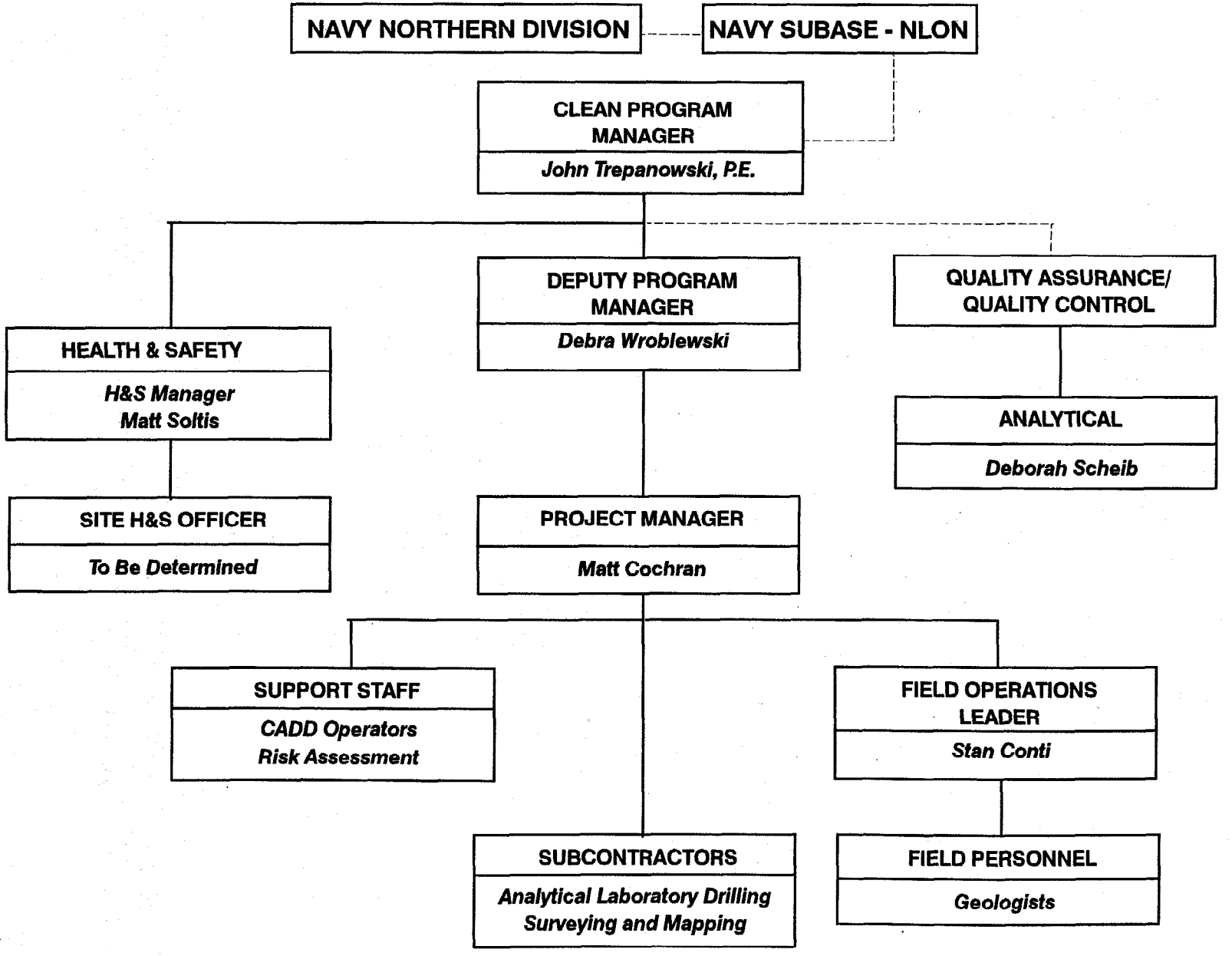
11.2 PROJECT MANAGER'S RESPONSIBILITY

The Halliburton NUS Project Manager (Matt Cochran) will provide overall direction to the project team and is responsible for overall technical, financial, scheduling, and QA/QC matters. The Project Manager will be the primary contact for the Northern Division's Engineer-in-Charge (EIC) and NSB-NLON Point-of-Contact (POC).

11.3 FIELD OPERATIONS LEADER

The field manager will be onsite and will implement the field sampling plan and will be responsible for worker health and safety as specified in the HASP. As such, he will be responsible for all day-to-day activities such as scheduling with subcontractors, daily logs, mobilization, demobilization, waste disposal, coordination with Navy personnel, etc.

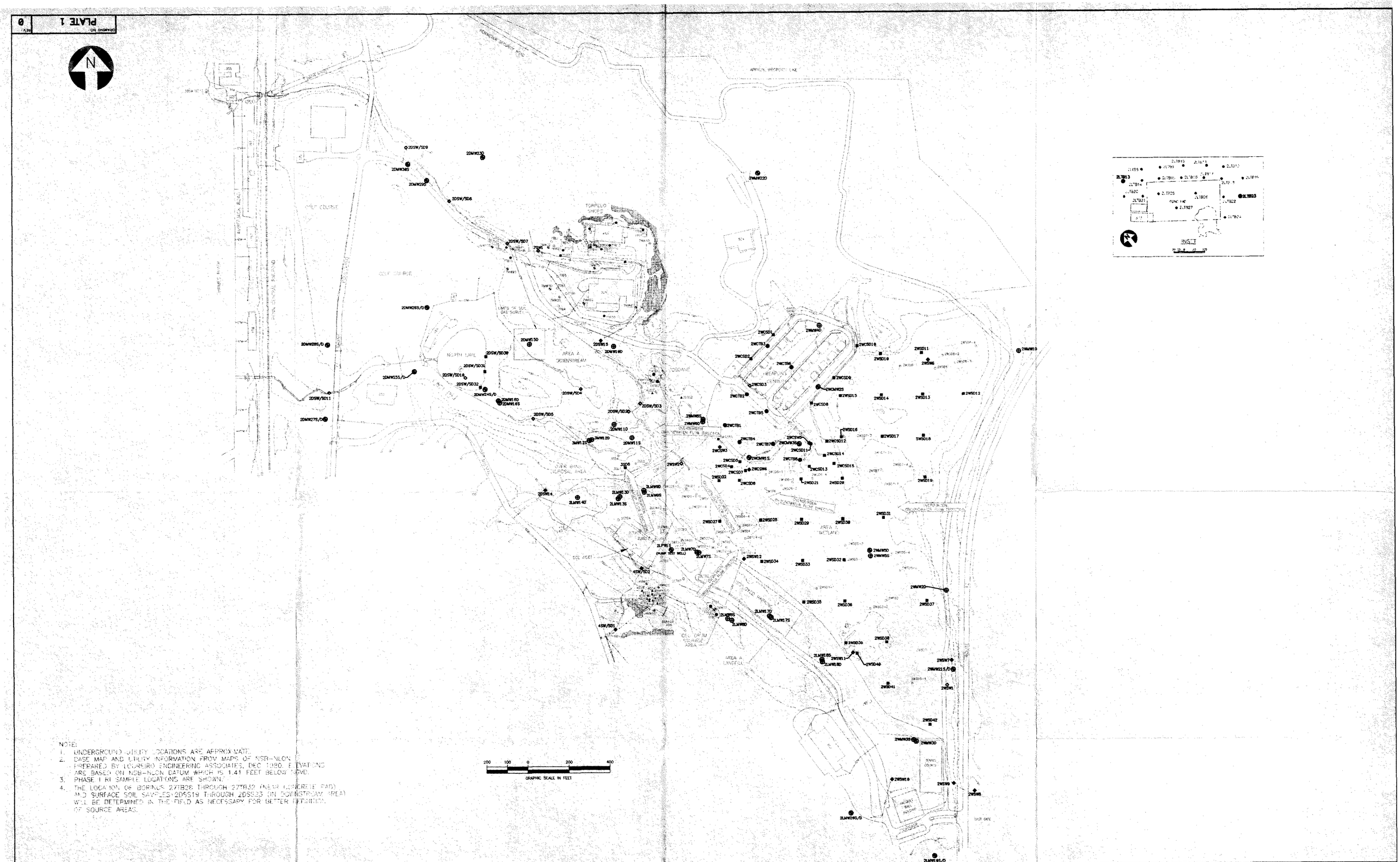
FIGURE 11-1
PROJECT ORGANIZATION



11.4 QA OFFICER'S RESPONSIBILITY

The Halliburton NUS QA Officer (Deb Scheib) will serve as Halliburton NUS' primary contact with the Northern Division's QA staff, if so requested by the EIC. She will monitor compliance of the project with the QA/QC Plan and perform any necessary audits initiate and report corrective actions and assist in preparing QA/QC project summaries for the Final Report.

Revised Plate 1



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3. PHASE I RI SAMPLE LOCATIONS ARE SHOWN.
4. THE LOCATION OF BORINGS 27TB28 THROUGH 27TB32 (NEAR CONCRETE PAD) AND SURFACE SOIL SAMPLES 2DSS19 THROUGH 2DSS23 (IN DOWNSTREAM AREA) WILL BE DETERMINED IN THE FIELD AS NECESSARY FOR BETTER DEFINITION OF SOURCE AREAS.

DATE	NO.	REVISION	BY

REFERENCE	DWG. NO.

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LEGEND

EXIST. PROP.
- MW01 MONITORING WELL
- TB01 TEST BORING
- SD01 SEDIMENT SAMPLE
- SS01 SURFACE SOIL SAMPLE
- SW01 SURFACE WATER SAMPLE
- DRAWDOWN OBSERVATION WELL
- 10 EXIST CONTOUR
- 123 BUILDING No.
- WATERCOURSE
- STM STORM SEWER

DRAWN	M. Jonnet (09/08/93)
CHECKED	
DESIGN ENGINEER	
PROCESS ENGINEER	
PROJECT MANAGER	
ENGINEERING MANAGER	P.C. Folvey
CLIENT APPROVAL	

HALLIBURTON NUS
Environmental Corporation
FOSTER PLAZA 7
661 ANDERSEN DRIVE
PITTSBURGH, PA 15220

TITLE: FIELD SAMPLING PLAN

NEW LONDON — CONNECTICUT

CLIENT	CONTRACT
NAVY	9594

SCALE	DATE	SHEET
AS SHOWN	AUGUST 1993	1 of 1

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